ELECTRICAL TIMES

THURSDAY
31 JAN.
1952
NINEPENCE

FERRANTI
Generator
TRANSFORMERS

A 58·5 MVA 11/134 kV FERRANTI GENERATOR TRANSFORMER for Braehead Power Station, leaving the Ferranti Transformer Factory at Hollinwood.

FERRANTI

FERRANTI LIMITED
HOLLINWOOD · LANCASHIRE
LONDON OFFICE: KERN HOUSE · KINGSWAY · W.C.2

F.T.108c

Industry's most versatile welding tool . . . Studs welded with the Nelson Gun show savings in time and money compared with bolts, pins, rivets or normal studs. You can use this new technique for every job of fixing to steel. The gun is light, easy to handle and calls for no welding skill. Already it is in use in every industry where steel is fabricated. The equipment comprises gun, control box and cables. Your exisiting D.C. welding set will drive it or the specially designed C.P. rectifier can be used.

NELSON STUD WELDING SERVICE

Crompton Parkinson LIMITED

CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2

Phone : CHAncery 3333 Grams : Crompark, Estrand, London

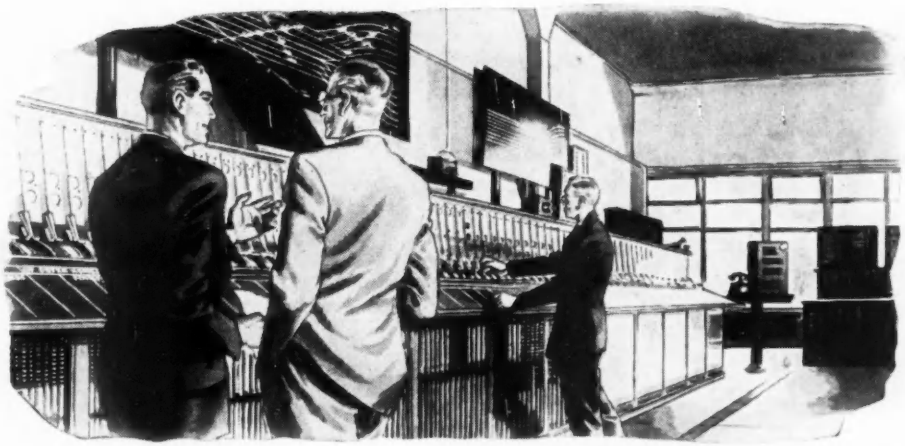
Yes, 15,000 batteries in use for 10 years...*

And a pretty repair bill, I expect—over that period?

The total cost was £2.10.0!

But how...?

THEY'RE NIFE, YOU SEE—MADE OF STEEL!



** These are the actual details of the performance of Nife batteries on one section of the railways.*

A triumph of design and technical skill in steel, Nife batteries have an unbeaten record —and almost complete freedom from replacement costs.

ROBUST CONSTRUCTION Made of steel — case and plates — a Nife battery has enormous mechanical strength.

COMPLETE RELIABILITY The almost inert electrolyte is actually a steel preservative — so that the battery does not deteriorate even during long periods of inactivity. It will withstand the heaviest rates of charge or discharge — and recover its voltage almost immediately.

SIMPLE MAINTENANCE A Nife is, for all practical purposes, free from self-discharge — the steel plates cannot buckle or shed active material and there is no corrosion of terminals.

(N.B. Nife Batteries are not yet available for private cars or domestic radio.)

N26

NIFE STEEL BATTERIES

REPAY THEIR ORIGINAL COST MANY TIMES OVER

NIFE BATTERIES · REDDITCH · WORCESTERSHIRE

A

better use – **HARRIS** *Tools*

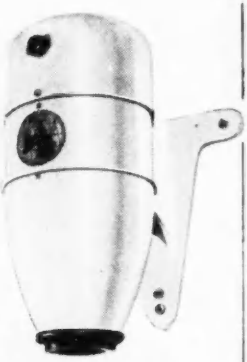
CUT THREAD
TAPS & DIES

GAUGES

JOHN HARRIS TOOLS LTD., WARWICK, phone: 741 (4 lines)

Press button...

... hands dried



. . . in 30 seconds by *antiseptic* hot-air stream. No contagion risk. Towel costs cut. Safe, efficient, economical. For factories, bakeries, hospitals, etc. Pedestal model (T.B. 214) also available.

200/250 volts. AC/DC Universal. Conduit or loose lead fixing.

	Wall-mounting model (T.B. 304)	Pedestal model (T.B. 214)
Oyster green or blue/grey hammered enamel.	£19.17.6	£25.0.0
Cream enamel.	£20.15.0	£26.5.0

OTHER MODELS AVAILABLE

SEND FOR LITERATURE

BYLOCK HAND DRYER

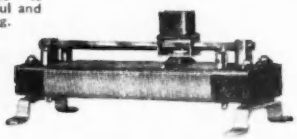
BYLOCK ELECTRIC LTD., ENFIELD, MIDDX.

IT IS A "CRESSALL-PRODUCT"

CRESSALL Resistances incorporate the soundest electrical and mechanical principles in design—yet prices are competitive.

CRESSALL Resistance

List No. 80 containing data and prices of our standard sliding Resistances is both useful and interesting. May we send you a copy?



CRESSALL

Registered Trade Name of

THE CRESSALL MANUFACTURING CO. LTD.
TOWER STREET BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 lines)
TELEGRAMS: "OHMIC" BIRMINGHAM

ASSOCIATED LEAD

and the

Electrical Trades

SOLDER • SOLID SOLDER WIRE • CORED SOLDER

SOLDERING FLUXES • LEAD CABLE ALLOYS • LEAD OXIDES

RED LEAD PAINTS • WHITE LEAD PAINTS

ASSOCIATED LEAD MANUFACTURERS LIMITED

Ibex House, Minories, EC3 LONDON • Crescent House NEWCASTLE • Lead Works Lane CHESTER

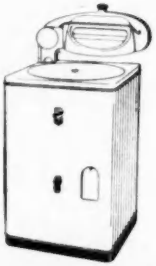
ASSOCIATED LEAD PRODUCTS

Export enquiries to: The Associated Lead Manufacturers Export Co. Ltd., Ibex House, Minories, London, EC3

'ENGLISH ELECTRIC'

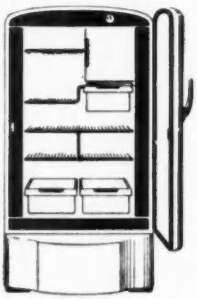
Domestic Appliances are

A SOUND INVESTMENT



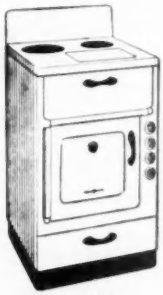
Washing Machine

The ideal machine for effortless and economical handling of all washing.



Refrigerator

Big capacity, yet uses the minimum of floor-space and electricity.



Cooker

Big oven. 3 hotplates. Perfect heat - control. Very economical.

Food Mixer

Juices and mixes. Two bowl sizes. Extra attachment for mincing.

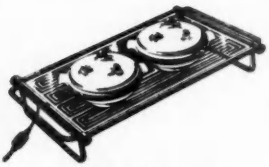


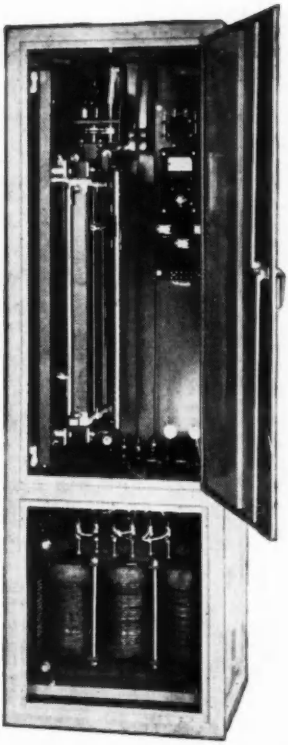
Plate Warmer

Combining good looks and first class efficiency. Gentle heat keeps the whole meal hot.

BRINGING YOU BETTER LIVING

The ENGLISH ELECTRIC Company Ltd., Queens House, Kingsway, London, W.C.2

BERCO/BPT Voltage & Current Control Equipment



Typical BERCO/BPT three phase Stabiliser 50 kVA.

FOR CONSTANT VOLTAGE

The Berco/B.P.T. single and three phase *automatic* stabilisers maintain a constant voltage unaffected by variations in the supply voltage, frequency, load and load power factor, with no wave form distortion. On the larger ratings the Regulating Transformers and brushes carry only a small portion of the load current. Standard air or oil cooled designs available.

BERCO hand-operated single-phase Regavolt.

Other BERCO and B.P.T. voltage and current regulating equipment includes Laboratory and Industrial sliding resistances, vitreous enamelled resistances, rotary rheostat potentiometers, stud switches, control knobs, etc.

FOR VARIABLE VOLTAGE

The REGAVOLT *hand operated* infinitely variable transformer enables output voltage to be pre-set to remain constant regardless of load. Designed for Industrial use and extremely robust in construction they are obtainable in single and three phase models.

THE BRITISH ELECTRIC RESISTANCE CO. LTD | BRITISH POWER TRANSFORMER CO. LTD

Queensway · Ponders End · Middlesex

Telephone: HOWARD 1492 Telegrams: VITROHM, ENFIELD

BR1031/1CX

RECORD INSTALLATION

of new generating plant, but

ELECTRICITY

is still in short supply

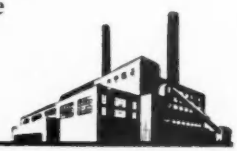
THE AMOUNT of new electricity generating plant commissioned annually has increased progressively during the past four years. In 1947 340 MW s.o. were commissioned. In 1948 the figure was 566 MW s.o., in 1949, 703 MW s.o. and in 1950, 965 MW s.o. Substantial though the post-war increase in generating capacity has been, it is not yet enough to make good the power shortage at times of Peak because of the continually rising demand. The usual peak hours are, Mondays to Fridays, 8 to 12 noon and 4 to 5.30 p.m., and during hours announced by the B.B.C.

Still more electricity is needed for rearmament and for home and export production. It can be supplied, despite the plant shortage, by existing power stations — *if* . . . The " if " is if too many users do not switch on at the same time. When they do, and " Peak " demands become too great, power cuts are unavoidable.

To help stop power cuts, domestic users, shops, hotels and offices are urged to keep their electric fires switched off and to cut down their demand in every possible way during Peak Hours. This will mean some sacrifice, but it will help keep the factories going.

Industries, too, in addition to their load-spreading arrangements, must use electricity with the utmost efficiency and economy. Above all there must be

NO WASTE



BRITISH ELECTRICITY

COUGHTRIE

Distinguished Lighting Fittings in Aluminium Alloy

COUGHTRIE

LIST NO. S.W.10/1G.R. 100 WATT

MANUFACTURED BY

J. & G. COUGHTRIE LTD.,

HILLINGTON, GLASGOW S.W.2.

CATALOGUE No. 511 AVAILABLE ON REQUEST

TRADE MARK

HIGGS MOTORS LTD

CHAIRMAN WALTER F. HIGGS, M.I.E.E.

BIRMINGHAM 6 ENGLAND

Our range of rotating electrical machinery above 250 HP covers a wide variety of types, outputs and speeds; for generators or motors of these larger sizes, specify the machine that is

GUARANTEED FOR EVER

Belfast, Birmingham, Bristol, Dundee, Glasgow, London, Manchester, Newcastle, Peterborough, Sheffield, Wolverhampton

Fluorescent lighting has never been so simple!

MUCH EASIER INSTALLATION AND MAINTENANCE

THESE VERY robust new Mazda fittings set new standards of economy in installation and maintenance. The reflector illustrated is for use with a single Mazda 80 watt 5 ft. Fluorescent Lamp. Similar fittings are also available with or without reflector and for use with one or two 80 watt lamps. All these fittings incorporate the new BTH Choke which is virtually silent in operation but has no compound or other filling.

For leadership in lighting

say Mazda!

THE BRITISH THOMSON-HOUSTON CO. LTD.
Crown House, Aldwych, London, W.C.2

Mazda F1150/1/8060

Designed for simplified installation by conduit, chain or BESA Box. Reflector slides off to expose detachable tray with auxiliary gear and lampholders ready-wired to one connector block.

Embossed end-plates interlock with adjacent fittings; knock-outs are provided for through wiring.

The fitting is of bonderised sheet-steel heavily stove enamelled in light stone colour and white. All holes in the metal are rubber-bushed.

Reflector can be supplied with or without upward light slots.

B T-H

M4580

THE NAME IS *Best* FOR QUALITY

This "BEST" COFFEE PERCOLATOR has a 2½-pint capacity, almost instant percolation, a special "keep hot" device and an automatic safety cut-out for the heater. Elegant in design and of superb craftsmanship in heavy gauge copper, it is finished in polished chrome. Loading 500 watts —A.C. only, 100/120, 200/220 and 230/250 volts.

"BEST" ELECTRIC KETTLE

Nominal capacity 3½ pints, the "BEST" Electric Kettle is beautifully made in solid copper with polished nickel or chromium finish (tinned internally). 1250-watt heater with Automatic Safety Connector-Ejector. For 100/120, 200/220, 230/250 volts, A.C./D.C.

"BEST" ELECTRIC JUGS

are useful alternatives to kettles for hot or boiling water supply. Their chromium plated repoussé finish on solid copper graces any table, and special insulated feet protect even the most highly polished surfaces. Capacity: 2 pints (700 watts), or 4 pints (1250 watts); voltages as above.

SPARE "BEST" ELEMENTS

of Non-Automatic and Automatic Safety Connector-Ejector types are of thoroughly reliable construction. Two sizes: 700 watts for 2-pint kettles, and 1250 watts for 3½, 4 or 6-pint kettles. Automatic thermal switch (bimetal) elements are available, also higher loadings if required.

Best Products Ltd

FELIX WORKS, FELIXSTOWE, SUFFOLK

Phone: Felixstowe 554. Grams: Best, Felixstowe

B12

Extensively

. . . used by Heating Engineers for large Housing Schemes. The essential Complement to every Immersion Heater.

EETO

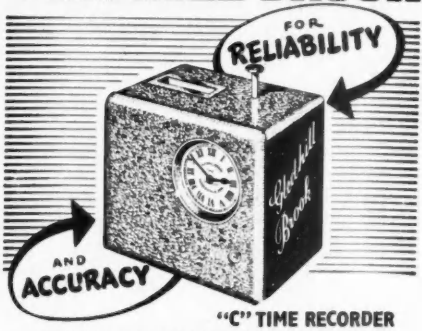
CYLINDER JACKETS

EETO Jackets are also made for Horizontal Cylinders, Square and Rectangular Tanks.

EETO INSULATIONS

River Street, Bolton, Lancs. Tel: Bolton 3764

GLEDHILL-BROOK



"C" TIME RECORDER

SPECIALLY DESIGNED FOR SMALL STAFFS

This useful GLEDHILL-BROOK Recorder is a handy portable size for small staffs. It records IN and OUT attendances as well as ON or OFF jobs. The clear and accurate time record is on the face of the card.

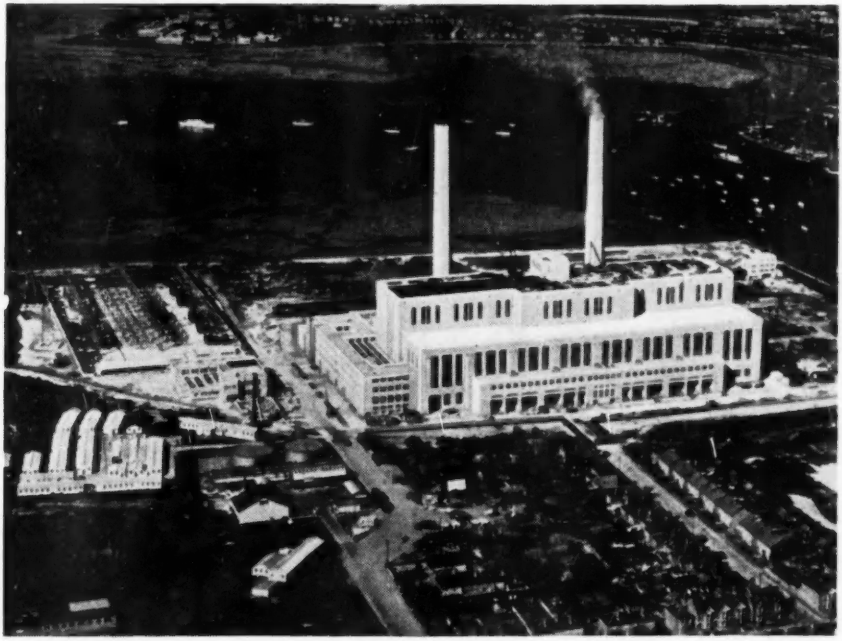
Available with an eight-day "G.B." mechanical clock movement with best quality lever escapement or the well-known "G.B." electric impulse movement. Soundly constructed in an all-steel case with cellulose finish.

Enquiries to:—

GLEDHILL-BROOK TIME RECORDERS LTD.

60, EMPIRE WORKS • HUDDERSFIELD

★ *If you want to talk switchgear . . . talk to Reyrolle*



AIR-BLAST SWITCHGEAR AT POOLE

For new power stations where the main switching is at 132 kV, Reyrolle air-blast switchgear is particularly suitable. The breaking capacity rating may be 2500 MVA or 3500 MVA and circuit-breakers of the former rating were selected for Poole Power Station.

In addition to the circuit-breakers, the open-type duplicate busbar sub station has isolators, post-type current-transformers and control equipment all of which were manufactured at Hebburn.

If you want to talk switchgear

A. Reyrolle & Company Ltd., Hebburn, Co. Durham. ***• • • talk to Reyrolle***

CRC 205

One sale often leads to another . . .

when you sell a SADIA

EVERY SADIA you sell goes out to be a salesman—for *you!* There's nothing more persuasive than hot water cheerfully gushing at the turn of a tap. Or more pleasing than the Sadia's clean, gleaming lines. Or more convincing than a Sadia owner's story of its trouble-free economical service.

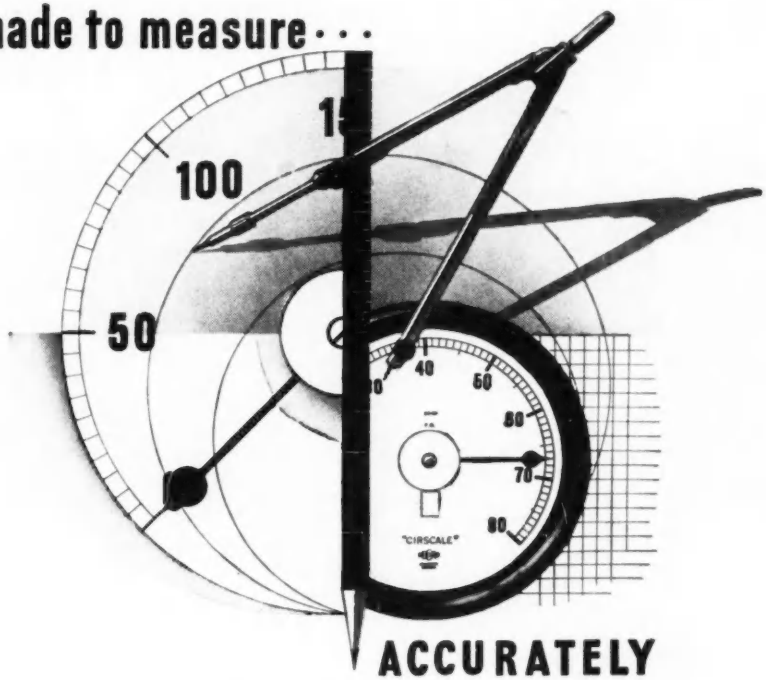
Sadias are built to last. Some of the first ever made—twenty-four years ago—are still working merrily away. That's why there's never a "come-back" when you sell a Sadia. You'll hear no more of it—except from the owner's friends and neighbours, who'll want Sadias for themselves.

SADIA
HOT WATER BY ELECTRICITY

Write for full details of latest models to:

AIDAS ELECTRIC LTD., SADIA WORKS, ROWDELL ROAD, NORTHOLT, GREENFORD, MIDDLESEX

made to measure . . .



ACCURATELY

The man who knows exactly what his machine is doing—who has accurate, constant and visual indication of its Consumption; its Speed; its Output, etc. is wise.

But, one who uses a "RECORD" Electrical Measuring Instrument is wisest. It is made to measure—ACCURATELY, by those who were the pioneers of the "CIRSCALE" and who have kept ahead.

RECORD

"RECORD" Instruments include:—
Switchboard Instruments, "Cirscale" Switchboard Instruments, Portable Instruments, Insulation and Resistance Test Sets, Cut-Outs, "Circscale" Electric Tachometers, Current Transformers, Chart Recorders, Shirley Moisture Meters, Shirley Static Eliminators.

THE RECORD ELECTRICAL COMPANY LIMITED

BROADHEATH · ALTRINCHAM · CHESHIRE

Phone: Altrincham 3221/2/3
London Office: 28 Victoria Street, S.W.1
Grams: "Circscale" Sowest, London

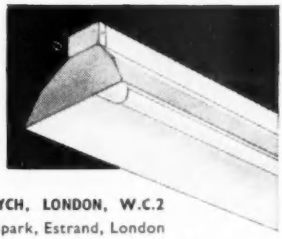
Cables and Grams: "Cirscale" Altrincham
Phone: Abbey 5148 and 2783
Cables: "Circscale" London

. . . so I said to the manager, 'Girls don't like working at this factory because it's dark and dreary and they get eyestrain at the end of a day's work. Now take Nicholson's' I said . . . but before I could go on, he'd gone. I must say he lost no time because the Crompton Parkinson man was here the next day to measure up the place for the new lighting. Now it's the brightest place I've ever worked at and look how many new girls we've got."

For shop, office, showroom or factory, Crompton Fittings are the latest answer to every lighting problem. It costs you nothing to call in a Crompton Lighting Service engineer.

Switch to

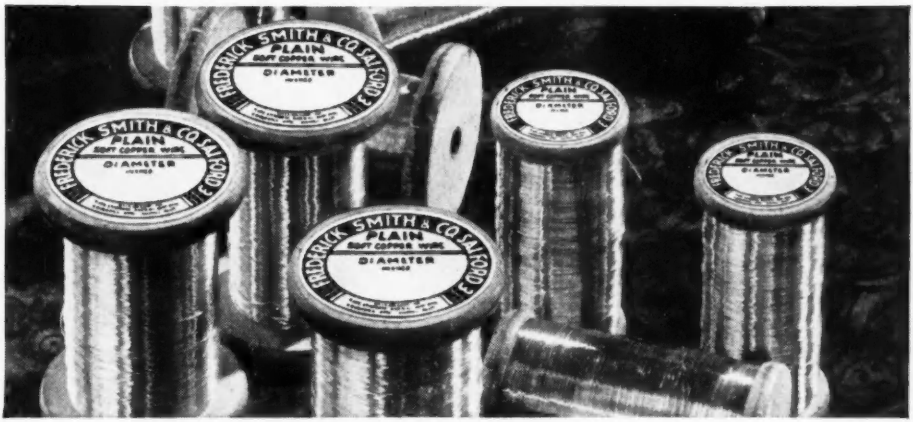
Crompton



BY APPOINTMENT MANUFACTURERS OF ELECTRIC LAMPS TO H.M. THE KING

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2
Telephone: CHAncery 3333 Telegrams: Crompark, Estrand, London

COPPER FOR ELECTRICAL PURPOSES



FINE BARE WIRES

The exceptional ductility of copper permits the drawing of wires as fine as one thousandth of an inch in diameter. These fine wires which are used in electric cables, instruments and radio parts must comply with exacting requirements. If you desire wires that are *fine* in all senses of the word—

FS & CO

specify ANACOS REGD.

FREDERICK SMITH & COMPANY

ANACONDA WORKS SALFORD 3, LANCS

Incorporated in The London Electric Wire Company and Smiths Limited
Associated with The Liverpool Electric Cable Co. Ltd. and Vactite Wire Co. Ltd.

Electrical Insulation

MICA

Washers
Plates
Commutator Segments
Stampings
Stove Plates
Heater Strips,
etc.

MICANITE

Mouldings, Commutator Vee Rings, Tubes, Covered Bars, Commutator Segments, Heater Strips, Sheet Material in Moulding, Flexible, Heat Resisting and Commutator Qualities, etc.

BAKELITE

Tubes
Bushes
Bobbins
Washers
Stampings
Panels
Covered Bars,
etc.

Manufactured by

EAST LONDON MICA WORKS

RINGWOOD ROAD, WALTHAMSTOW, LONDON, E.17

'Phone: KEYstone 4254 *Telegrams: Elmicmer, Easphone, London*

"Dunlow" **ELECTRIC OIL HEATERS**

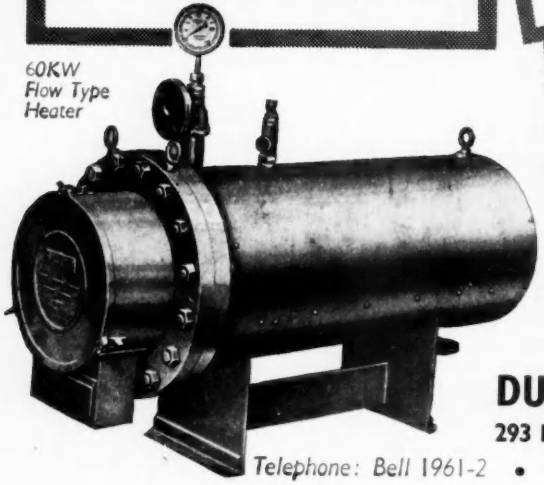
SAFE · EFFICIENT · ECONOMICAL

SAVE MONEY by using the lower-priced heavy oils preheated by means of "Dunlow" Electric Line and Immersion Heaters.

WE SPECIALISE in the manufacture of heaters to meet individual requirements. Loadings 1 kW to 300 kW. Fully automatic for low- and high-pressure systems.

APPLICATION: Main Storage Tanks, Oil Separators, Daily Oil Supply Tanks, Lubricating Oil Purifiers, Pipe Line to Burners, Diesel Engines, etc.

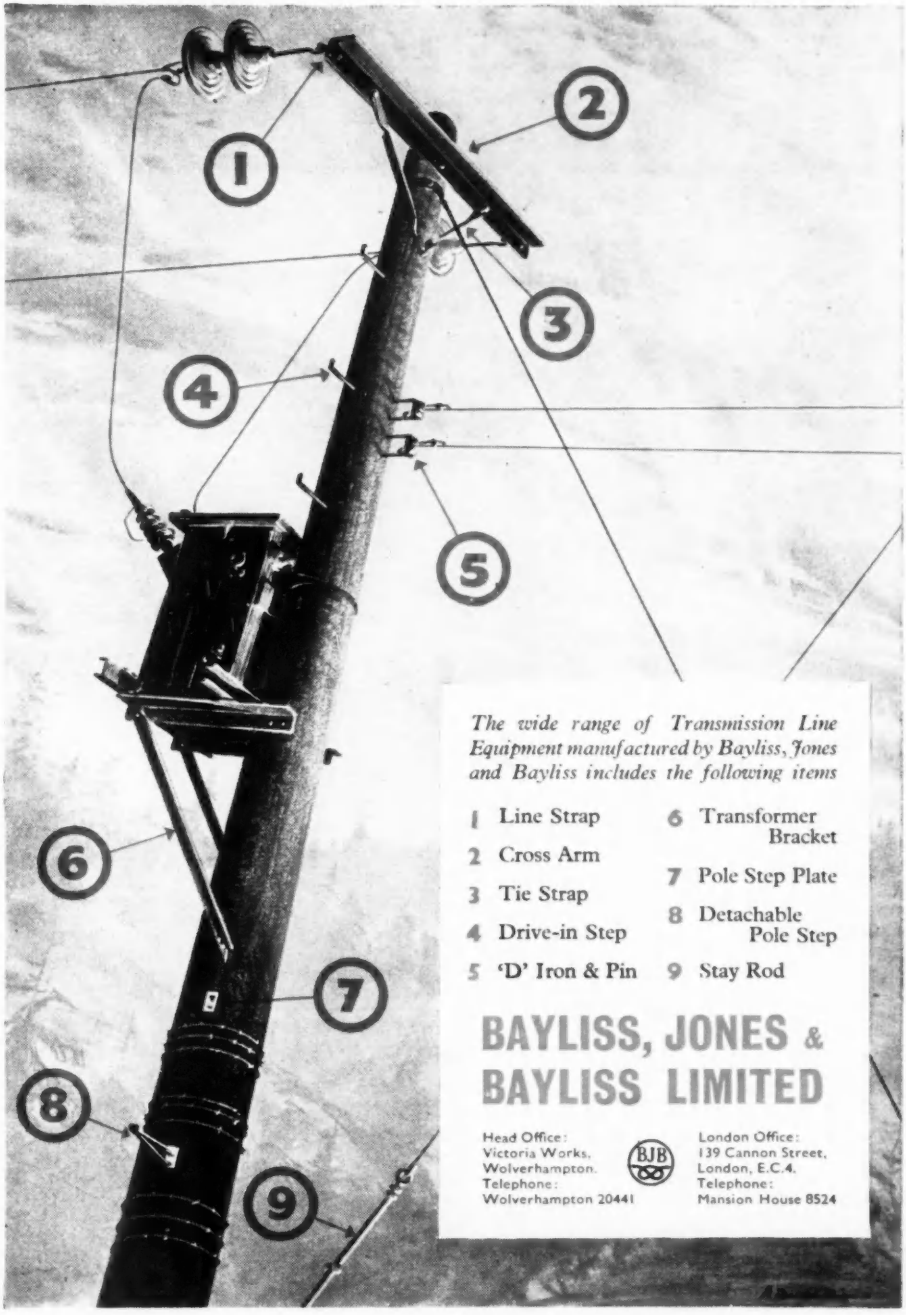
60KW Flow Type Heater



DUNCAN LOW LTD

293 BELL ST., GLASGOW, C4

Telephone: Bell 1961-2 • Telegrams "Immerser Glasgow"



The wide range of Transmission Line Equipment manufactured by Bayliss, Jones and Bayliss includes the following items

1 Line Strap
2 Cross Arm
3 Tie Strap
4 Drive-in Step
5 'D' Iron & Pin
6 Transformer Bracket
7 Pole Step Plate
8 Detachable Pole Step
9 Stay Rod

BAYLISS, JONES & BAYLISS LIMITED

Head Office:
Victoria Works,
Wolverhampton.
Telephone:
Wolverhampton 20441

BJB

London Office:
139 Cannon Street,
London, E.C.4.
Telephone:
Mansion House 8524

Tudor
SWITCH TRIPPING EQUIPMENT

Here is a completely reliable equipment, designed by Tudor for small installations where the battery is required only for tripping circuit breakers, usually at a pressure of 24 or 30 volts.

The cabinet, which may be of wood or steel, houses the battery and accessories and incorporates a trickle charge rectifier and test circuit.

Full details in TUDOR SWITCH TRIPPING Leaflet No. 85
Sent on request

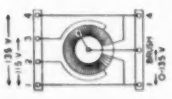
T.113

Tudor **BATTERIES**

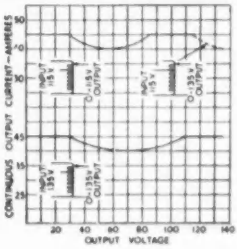
THE TUDOR ACCUMULATOR COMPANY LTD · 50 GROSVENOR GARDENS · LONDON · SW1

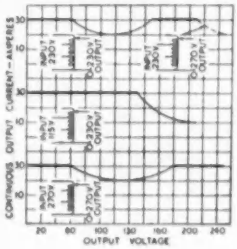
"VARIAC" voltage-regulating infinitely variable transformer

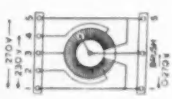
Reg^{d} Trade Mark



OUTPUT CURRENT CHARACTERISTIC AND TERMINAL ARRANGEMENT FOR TYPE 50-A TRANSFORMER







OUTPUT CURRENT CHARACTERISTIC AND TERMINAL ARRANGEMENT FOR TYPE 50-B TRANSFORMER

SPECIFICATIONS							
TYPE	LOAD RATING	INPUT VOLTAGE	CURRENT		OUTPUT VOLTAGE	NO-LOAD LOSS	NET PRICE £ s d *
			RATED	MAXIMUM			
50-A	5 kva.	115 v.	40 a.	45 a.	0-135 v.	65 watts	44 18 6
50-B	7 kva.	230/115 v.	20 a.	31 a.	0-270 v.	90 watts	44 18 6

***All "VARIAC" prices plus 10% as from 1st June, 1951.**

SERIES 50 "VARIAC" TRANSFORMERS

With a "VARIAC," voltages are instantly and minutely adjustable from O-Line Voltage. On some patterns, such as 50-B, there is even an "over voltage" feature. This can provide over line voltage, or compensate for low lines. See curves and input and output connections, shown above. A very special application for this large transformer is operating them in 3-gang assembly on 3-phase work. A 3-gang 50-B will control 21 Kva. Many other suggestions on the use of "VARIAC" Transformers are contained in Catalogue V549 which will gladly be sent on request.

TYPE 50-B

CLAUDE LYONS LTD.

ELECTRICAL AND RADIO LABORATORY APPARATUS, ETC.

180 Tottenham Court Road, London, W.1, and 76 Oldhall Street, Liverpool, 3, Lancs.

SPANNING THE GAP!

Power station engineering by Simon-Carves is helping to span the gap between electricity demand and supply.

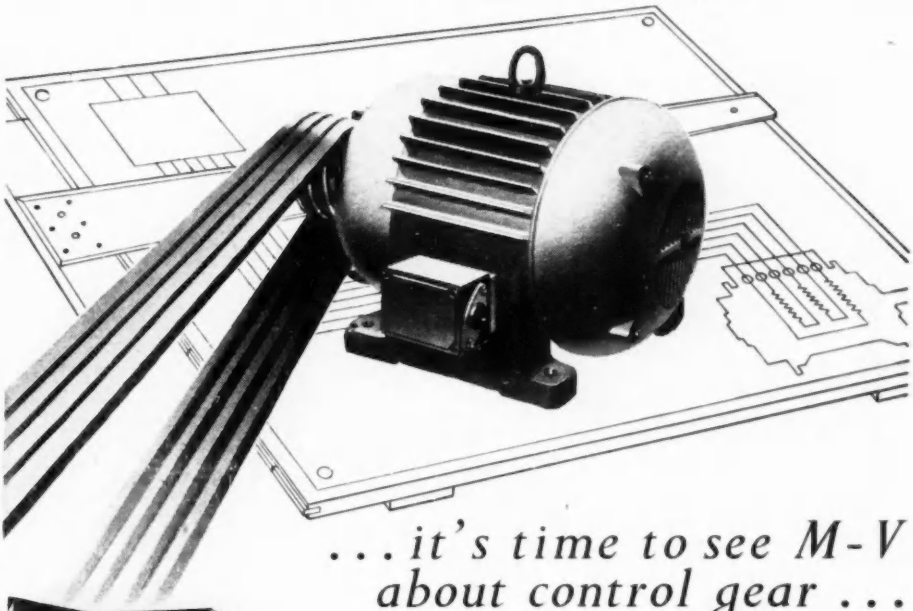
This coal conveyor bridge over the Mersey at Warrington was built by Simon-Carves during the extension of the Howley Generating Station from 18,000 to 90,000 kW capacity. Four Simon-Carves boilers are in use and the fifth is under construction; Simon-Carves were also responsible for demolitions, foundations, new buildings and extensions, chimneys, ash handling plant and other associated work.

Steam power by **Simon-Carves Ltd** SIMON ENGINEERING GROUP

STOCKPORT ENGLAND

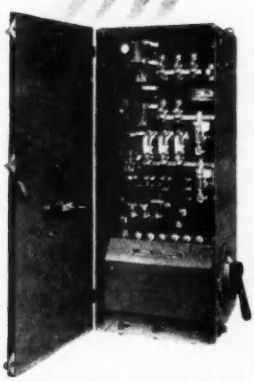
S.C.38

When a Motor Drive is on the drawing board ...

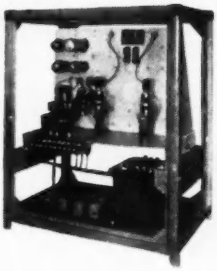


... it's time to see M-V about control gear ...

When you are thinking of installing a motor, think also of Metrovick control gear. Trouble, time and cost are saved by consulting M-V when a motor drive is in the planning stage. M-V design and build all types of control gear from switch-starters for fractional hp motors to elaborate electronic controls for complex industrial processes. The experience of M-V engineers therefore covers the complete range of control gear and their practical advice is at your service.



M-V Stator-rotor Contactor Starter



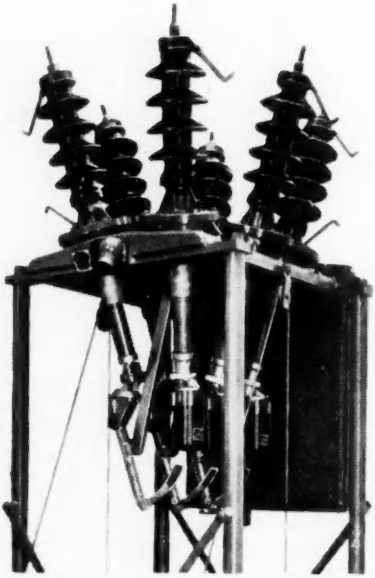
M-V Electronic Speed-control Equipment

M-V Hand-operated Oil-break Starter

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED, TRAFFORD PARK, MANCHESTER, 17.
Member of the A.E.I. group of companies

METROVICK *Control Gear for all Motor Drives*

HA 00/5



where

STRENGTH

is vital . . .

INSULATE

WITH

PERMALI

Laminated • Impregnated • Densified

PERMALI pull-rods fitted to 33kV 500/750 MVA Type ORT.2 Circuit Breaker. Photo by courtesy of A. Reyrolle & Co. Ltd.

Write for DATA SHEET C F25

PERMALI LTD. • GLOUCESTER • Telephone: 24941 • Telegrams: "NICO, GLOUCESTER"

The Mulsifyre System, which extinguishes **oil fires** by use of water only, is specially designed for the protection of Power Station and Sub-Station equipment. Since the first installation, nearly 20 years ago, it has been adopted by electrical engineers in many parts of the world.

MULSIFYRE

MATHER & PLATT LTD · MANCHESTER 10

'ENGLISH ELECTRIC'

transformers

Sub-station Transformers for Confined Spaces

Installing transformers in the confined areas of existing buildings in cities has frequently presented supply engineers with many difficulties. To meet these circumstances 'ENGLISH ELECTRIC' developed sub-station transformers with their overall dimensions reduced to a minimum.

Several of these low loss transformers rated at 500 kVA are to be used in the London area while other sizes below 500 kVA for service up to 11 kV are also made.

The illustration shows an 'ENGLISH ELECTRIC' 500 kVA transformer being lowered into a sub-station at the headquarters of the Institution of Electrical Engineers.

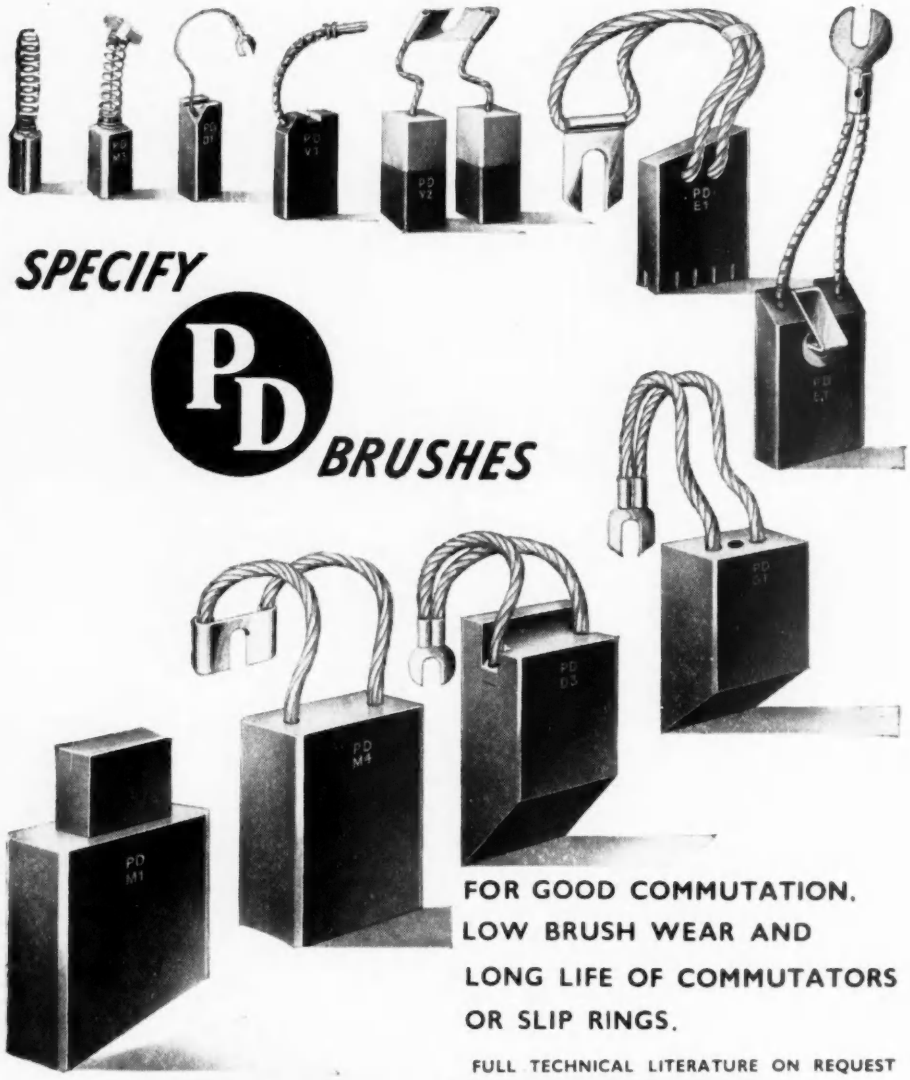
The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Transformer Department, Liverpool

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

TL.3



SPECIFY PD BRUSHES

FOR GOOD COMMUTATION, LOW BRUSH WEAR AND LONG LIFE OF COMMUTATORS OR SLIP RINGS.

FULL TECHNICAL LITERATURE ON REQUEST

POWELL DUFFRYN
CARBON PRODUCTS LTD

ELECTRICAL CARBONS DIVISION, SPRINGFIELD RD., HAYES, MIDDLESEX

TELEPHONE: HAYES 3994/8 TELEGRAMS: CARBONACES, HAYES.

NEON SIGN CABLES AND CAPACITORS

LAST LONGER

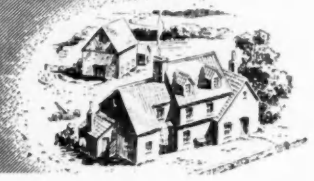
BICC Neon Sign Capacitors and Cables are made to the customary high standard of this Company's products, and will give many years of trouble-free service. They are specifically designed for their respective jobs and fully comply with B.S.559.

Publication No.265U (Neon Sign Cables) and Publication No.262U (Neon Sign Capacitors) containing further information are available on request.

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

ELECTRIC LIGHT AND POWER

Anywhere



• AUTOMATICALLY WITH A
LISTER PLANT
• WITHOUT STORAGE BATTERIES

Operates standard electric appliances; running cost is less than 2d. per unit.

Full particulars from **R. A. LISTER & Co. Ltd.**

Head Office and Works:
DURSLEY, GLOUCESTERSHIRE Tel.: DURSLEY 2371
LONDON: Imperial House, Kingsway. Tel. TEMple Bar 9681
Also at STAMFORD · GLASGOW · DUBLIN

Ventilation
by
FENTON, BYRN & Co LTD

THE PROPELLER FAN...

delivery from 360—2,500 cu. ft. of air per hour (intake or exhaust). Can be supplied with speed regulators, wire guards or Louvre shutters. A.C. or D.C. voltages. Sizes 9″, 12″ and 16″.

WALL FANS · PROPELLER FANS · MOTORISED ROOF COWLS · WINDOW VENTILATORS
WINDOW FANS · SPACE HEATERS
DESK AND CEILING FANS
COMPLETE VENTILATING SCHEMES AND ANCILLARY EQUIPMENT

Air-flow

FENTON, BYRN & CO. LTD., AIRFLOW WORKS, BERRYLANDS ROAD, SURBITON, SURREY
Ventilating Engineers - Fan Manufacturers 'Phone: Elmbridge 6724/5 'Grams: Airlation, Surbiton

ELECTRICAL INDUSTRIES BENEVOLENT ASSOCIATION
(Birmingham Area)

GRAND DANCE

Friday, 15th February, 1952

TUBE INVESTMENTS
SOCIAL CLUB
BALLROOM
Broadwall Road, Oldbury

FIRST CLASS BAND

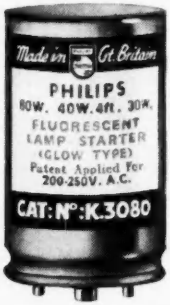
Ample parking facilities

• •

Tickets are TEN SHILLINGS each, obtainable from L. WALL, Hon. Sec., E.I.B.A., c/o Electrical Components, Ltd. 102 Snow Hill, Birmingham 4

The space for this announcement has been provided by The British Thomson-Houston Co., Ltd., Rugby

FULL MARKS TO



★★★★★ ★★★★★

PHILIPS
FLUORESCENT STARTERS FOR

✓ *EFFICIENCY:* The very slight *controlled* delay ensures positive lamp starting every time.

✓ *ECONOMY:* Philips starters cut lighting costs by eliminating flicker, thereby increasing lamp life and reducing maintenance costs.

✓ *INTERCHANGEABILITY:* Philips Fluorescent Starters are interchangeable with other makes of starter of similar ratings A.C. 200-250V. mains.

✓ *VERSATILITY:* Philips Starters do away with the need for stocking many different types. Model K.3080 is ideal for *all* 80W. 5 ft., 40W. 4 ft., and 30W. 3 ft. lamps on A.C. 200-250V.

✓ *DEPENDABILITY:* Like all Philips products, these starters are absolutely dependable. You can rely on them to provide perfect, trouble-free lamp starting year after year.

PHILIPS
PHILIPS ELECTRICAL LTD.
Century House, Shaftesbury Avenue, London, W.C.2. (LD979)

PITMAN

Cathode Ray Oscillographs

By J. H. Reyner, B.Sc.(Hons.), A.C.G.I., D.I.C., etc. A comprehensive account of the practical applications of cathode ray tubes and the theory underlying them. Fourth Edition. 15/- net.

"Anyone desiring an understanding of the cathode ray oscillograph cannot do better than purchase this book."—*Electrical Times.*

Fractional H.-P. Electric Motors

By F. G. Spreadbury, M.Inst.B.E., M.A.I.E.E. The principles of fractional h.p. motors, their construction and design, performance characteristics and speed control are all treated exhaustively in this important work. Profusely illustrated. 35/- net.

All-Purpose Diesels

By J. Malcolm Robson; with a chapter by C. A. Pickering. An up-to-date guide to the design and practical applications of diesel power units. The theory involved is adequately explained. With 231 illustrations. 50/- net.

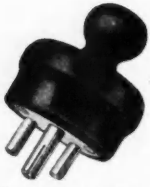
Industrial Administration and Management

By F. L. Meyenberg, M.I.Mech.E., M.I Ec.E. A textbook for students taking the various professional examinations featuring this subject. In particular, it covers the syllabus of Section C of the Associate Membership examination of the Institution of Mechanical Engineers. 35/- net.

PITMAN, Parker Street, Kingsway, London, W.C.2.

insist on **SAX**

RUBBER COVERED PLUG TOPS



HANDSHIELD PATTERN
for
INDUSTRIAL USE

★ RESILIENT
★ SUBSTANTIALLY CONSTRUCTED
★ EASILY WIRED
5 & 15 Amp 3-Pin

Other Products include
- Bakelite cased and Ironclad Bells
- Indicators
- Bell Pushes
- Wall Sockets & Plugs

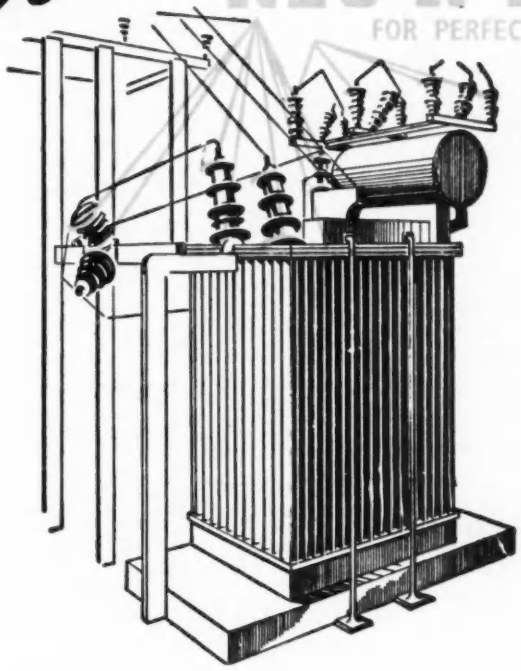
Diagrams and Illustrated Catalogue on application

TRADE MARK
JULIUS SAX & CO. LTD.
24 COMMERCE RD. BRENTFORD.
Telephone EALing 6034-5

A Joint to forget Material to Remember

NEO-K-TEX

FOR PERFECT SEALING



- GASKETS
- WASHERS
- SHEETS
- MOULDINGS

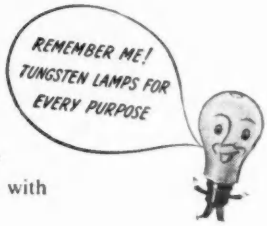
RESISTANT TO OIL, PETROL, WATER AND MOST INDUSTRIAL SOLVENTS

KAUTEX LTD. ELSTREE WAY ELSTREE HERTS Tel. ELSTREE 1777-8-9

The life of **two lamps** for the **price of one**

EKCO DOUBLE-LIFE fluorescent LAMPS

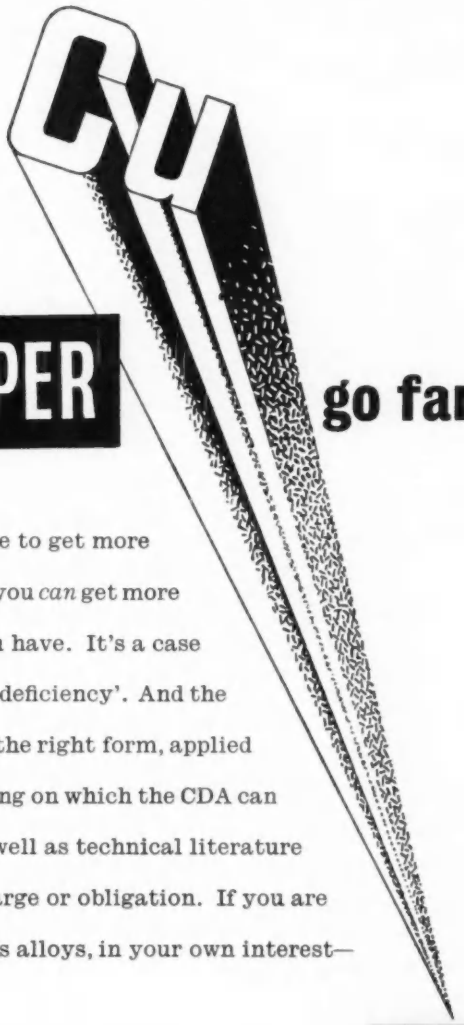
IT'S GOOD BUSINESS to offer your customers double value-for-money—it's the way to **double** your customers! Every Ekco Fluorescent lamp has a rated average life of *5,000 hours*—double the previous life—a selling point you can use to capture the new and replacement business in your area. *Stock up now* with Ekco double-life Fluorescent lamps.



SALES OFFICES, ILLUMINATING ENGINEERING DEPTS., SHOWROOMS AND DEPOTS

London 45 Essex Street, W.C.2. . Tel. City 8951
Cardiff 50 Bridge Street. . . . Tel. Cardiff 5426
Glasgow 26 India Street. C.2. Tel. Central 2012
Preston Kent Street Works. . . . . Tel. Preston 4628
Nottingham 57 Hounds Gate . Tel. Nottingham 45862
Birmingham 40-42 Summer Row, B'ham 3. Tel. Central 2997

EKCO-ENSIGN ELECTRIC LTD.

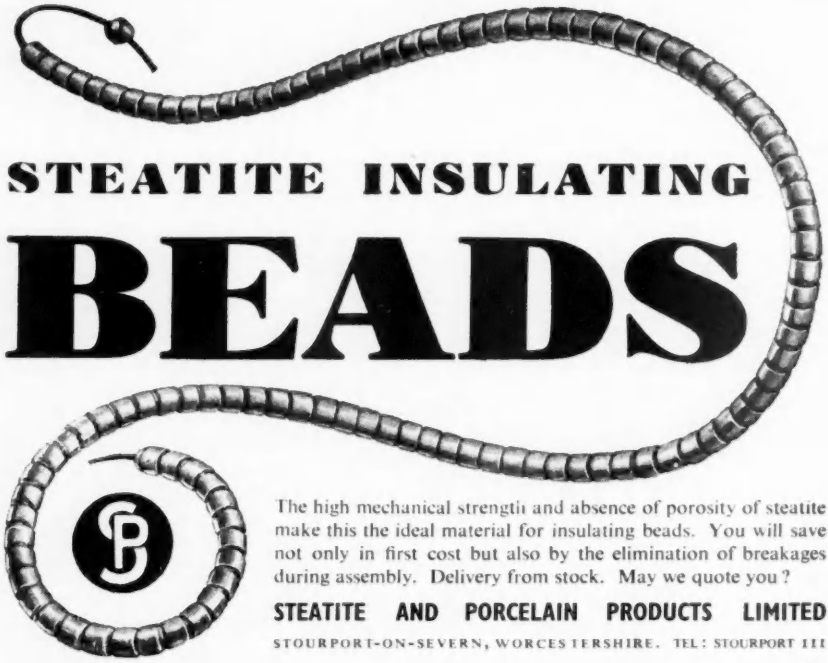


Make COPPER go farther

You may not be able to get more copper at the moment, but you *can* get more from the copper you have. It's a case of 'more efficiency, less deficiency'. And the right material, in the right form, applied in the right way is something on which the CDA can give expert advice—as well as technical literature—free of charge or obligation. If you are concerned with copper or its alloys, in your own interest—

Consult the CDA

COPPER DEVELOPMENT ASSOCIATION KENDALS HALL · RADLETT · HERTS



STEATITE INSULATING BEADS

The high mechanical strength and absence of porosity of steatite make this the ideal material for insulating beads. You will save not only in first cost but also by the elimination of breakages during assembly. Delivery from stock. May we quote you?

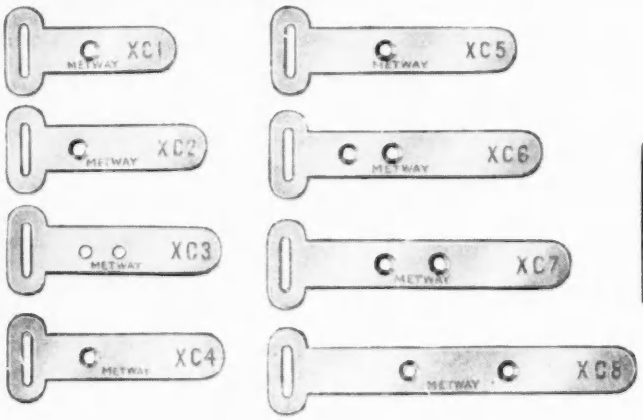
STEATITE AND PORCELAIN PRODUCTS LIMITED

STOURPORT-ON-SEVERN, WORCESTERSHIRE. TEL: STOURPORT 111

S.P.70

TINNED CABLE CLIPS

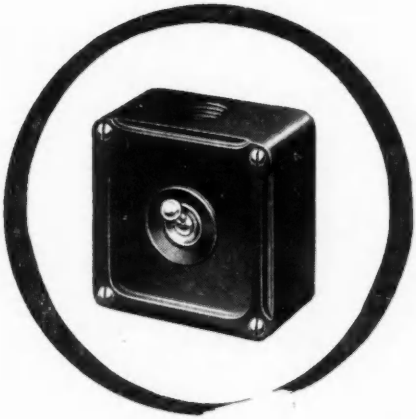
METWAY PRODUCTS
Registered Trade Mark



PROMPT DELIVERY —at the moment!

Ask for **LIST No. DG/2/T.E.** giving details of sizes, prices and quantity rates. Please enclose 6d. in stamps for postage.

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON 1
Phone: Brighton 28366. Grams: Metway, Phone, Brighton



BRITMAC

The standing of any product in its class depends on many things, but on *none* so important as those instantly reflected in the article itself . . . appearance, workmanship and efficiency. These qualities are immediately evident in all Britmac components and establish *their position at the head of their class.*

the points in favour . . .

ILLUSTRATIONS:

5 amp., Ironclad switch units, Industrial type. Finished black enamelled with nickel plated dollies, bridges and lid fixing screws. Catalogue Numbers P.1540 (Flat lid) and P.1552 (fully protected lid). Available in 5 amp. up to 25 way; 15 amp. up to 12 way; with shallow or deep type boxes.

. . . *at every point* — "BRITMAC"

BRITMAC ELECTRICAL CO. LTD

SALES ORGANISATION OF C. H. PARSONS LTD

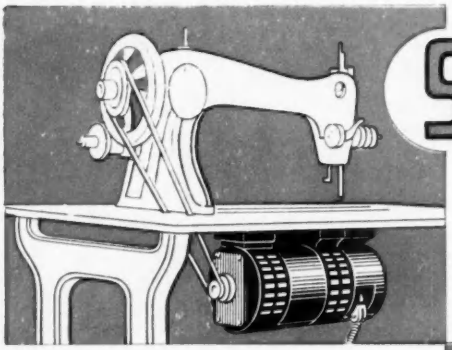
HEAD OFFICE · BRITANNIA WORKS · WHARFDALE ROAD · TYSELEY · BIRMINGHAM · 11

Telephone: ACOCKS GREEN 1191 (3 lines) · *Telegrams:* "BRITMAC, BIRMINGHAM"

London Office:
121, VICTORIA ST., S.W.1
Telephone: VICTORIA 9778/9

Glasgow Office:
247a, ST. VINCENT ST., &
93, DOUGLAS ST., C.2
Telephone: CENTRAL 3445/6

SM BE 313b



SEW-TRIC

SEWING MACHINE

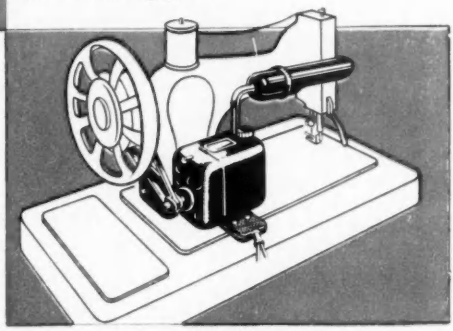
MOTORS

1/15 H.P. A.C./D.C.

Motor started and controlled by light pressure on foot control pedal, leaving both hands free. No fatigue.

Needle light fitted on motor to relieve eye strain.

Running cost negligible.



"MONOBLOCK" Trade Sewing Machine Motor.
Entirely new design.

Motor started and controlled by light pressure on treadle. Ferodo brake stops sewing machine instantly when pressure on treadle is released.

Ideal motor for dressmaking, tailoring, glove, hat, fur trades, etc. Low current consumption.

SEW-TRIC LTD

Sew-Tric House · Honeypot Lane · Stanmore
MIDDLESEX

CABLE MARKERS

Interlocking Type

The Critchley Interlocking Ferrule is a simple and economical solution to the problem of identifying cable ends where a wide range of markings is required

Leaflet on request

KEYED FOR PERMANENT ALIGNMENT

The patented key ensures that the ferrules can only be assembled with the figures in line and **CANNOT COME OUT OF ALIGNMENT AFTERWARDS.** Standard colours—**Black, White, Red, Blue, Yellow and Green.**

CRITCHLEY BROS LTD - BRIMSCOMBE - STROUD

Telephone Brimscombe 2208

FOR LABORATORY AND TEST ROOM PRECISION MEASUREMENTS

ELLIOTT

ELECTRICAL MEASURING INSTRUMENTS

This air-cored reflecting dynamometer wattmeter is an example of the Elliott range of precision measuring equipment. Low power consumption and suitability for use at low power factors enable it to be used for applications such as iron loss investigations, testing of fluorescent lamps, etc.

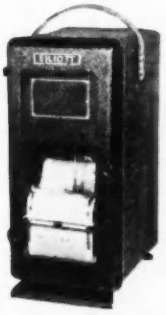
The range of portable instruments and test sets also includes dynamometer, moving coil and moving iron types for electrical laboratory and industrial purposes.

Send for particulars of Elliott Portable Measuring Instruments and Testing Sets

ELLIOTT ELECTRICAL RECORDERS

For industrial and research applications for the measurement of volts, amps, watts, kVA, frequency, power factor, etc.

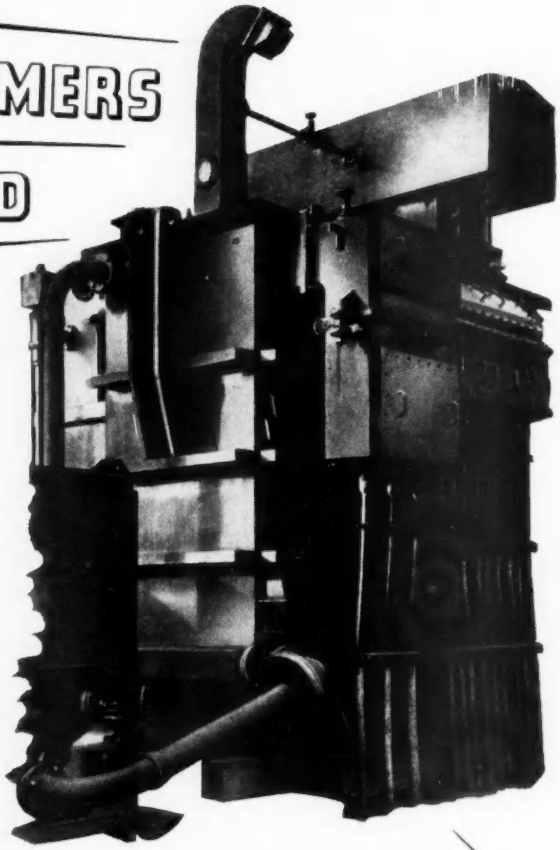
Full details on request.



ELLIOTT BROTHERS (LONDON) LTD.

CENTURY WORKS, LEWISHAM, LONDON, S.E.13. *Telephone:* TIDeway 3232

TRANSFORMERS OF PROVED MERIT



WE SPECIALISE in manufacturing Power Transformers for Generation, Transmission and Distribution

ALL YORKSHIRE Transformers are entirely manufactured in our own works. We make Transformers to suit all requirements up to 45,000 k.V.A.-132,000 volts

YORKSHIRE YET TRANSFORMERS

YORKSHIRE ELECTRIC TRANSFORMER CO., LTD., THORNHILL, DEWSBURY, YORKSHIRE
Phone: Dewsbury 1691/2

scarab

Freedom from tracking is the outstanding characteristic of mouldings made from Scarab. Scarab moulding powder is inexpensive, easy to mould and is made in black, brown and a wide range of colours.

is

There is a special plasticised grade with low after-shrinkage for moulding around heavy inserts. Write for technical leaflets. Standard Scarab moulding powder conforms to BS.1322, Type U.

non tracking

Distributed by

THE BEETLE PRODUCTS COMPANY LTD.

1 Argyll Street, London, W.1.

B·I·P GROUP

Scarab is a trade mark registered in Great Britain and in most countries of the world.

The
skilled hands
of
Serck

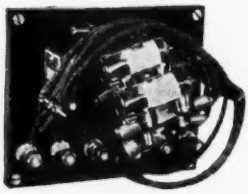
Controlled pouring in the foundry is essential for a sound billet.

Serck
NON-FERROUS TUBES
SERCK TUBES LIMITED
BIRMINGHAM 11

A new range of
Lighting Fittings
—Your copy on request

WILLIAM McGEOCH & CO. LTD.
BORDESLEY, BIRMINGHAM 10
28 WEST CAMPBELL ST., GLASGOW C.2
43 BERNERS STREET, LONDON W.1
26 ELDON SQ., NEWCASTLE-ON-TYNE

EG RELAYS and CONTACTORS



A.I.D. APPROVED AND CONTRACTORS TO: ADMIRALTY, M.A.P., AIR MINISTRY, M.O.S., WAR OFFICE, G.P.O., H.M.O.W., L.C.C., BRITISH RAILWAYS, etc.

Available at all voltages and currents, A.C. or D.C., up to 100 amp. Single, Double or Triple Pole. Also Voltage and Current Sensitive RELAYS, Time-Lag RELAYS. MIDGET RELAYS—Open and Hermetically sealed. M.O.S. approved Types. Plug-in Valve RELAYS. MERCURY SWITCHES. Adjustable and Preset Electric Contact THERMOMETERS.

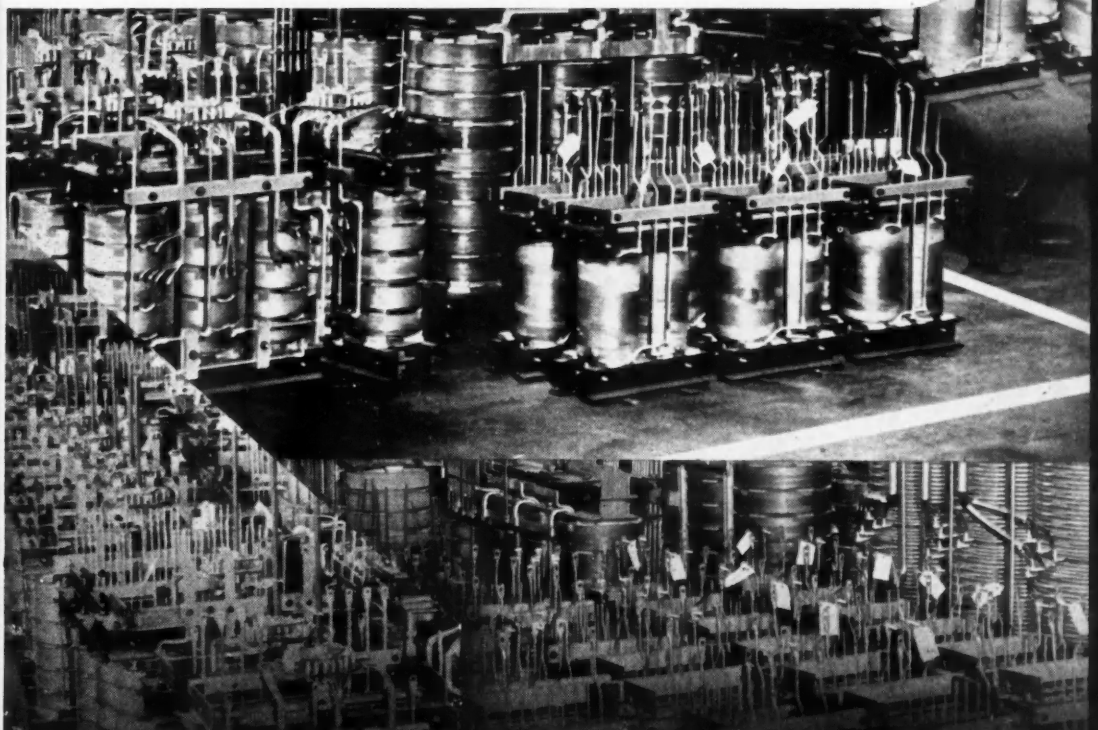
Write for Catalogue

ENGEL & GIBBS LTD.
Warwick Road, Boreham Wood, Herts
Telegrams: "Tormometer, Boreham Wood"
Telephone: ELStree 2291-2-3-4

Bread & Butter

Much as we like the spectacular jobs, we realise that it is the small and medium-sized transformers that constitute the bulk of the day-to-day demand.

In the J. & P. transformer shop the little jobs receive the same care and individual attention as is given to the giant grid transformers—and every one has that "little more" for which we are noted.



JOHNSON & PHILLIPS LTD.,

CHARLTON · LONDON · S.E.7

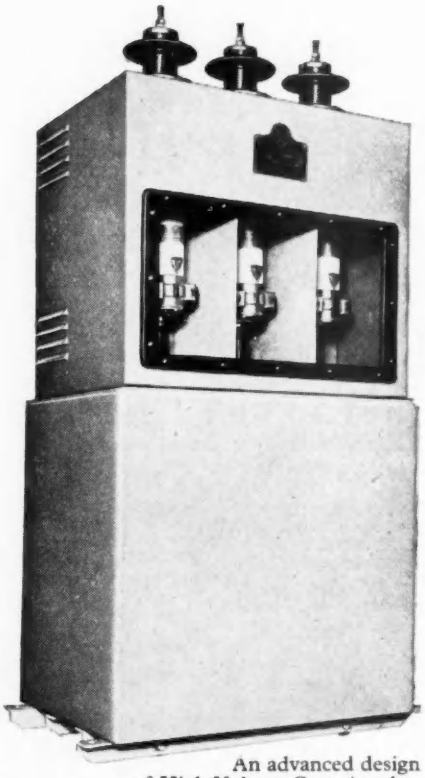
The mark that means that "little more" in quality

Standard

high voltage capacitors for

power factor correction

1000 volts and over



An advanced design of High Voltage Capacitor has been developed by *Standard* laboratories to ensure satisfactory operation over a wide range of ambient temperatures. H.V. Capacitors are manufactured up to a maximum rating of 250 kVAr and higher ratings are assembled by grouping together the required number of units in a manner best suited to site conditions.

Indicating fuses and discharge resistors are standard fittings and are contained in a metal hood which has a transparent panel or ports allowing rapid inspection. Removal of the panel permits replacement of fuses.

These capacitors are contained in hermetically sealed tanks which are mounted on rollers and fitted with lifting lugs and are suitable for indoor and outdoor operation. Terminations may be made to a cable box or to outdoor bushings as required.

The advice of Standard engineers is available without charge, problems will be investigated and estimates prepared without obligation. Full details of this and other ranges of Standard Power Factor Correction Capacitors may be obtained from :

Standard Telephones and Cables Limited

Registered Office : Connaught House, Aldwych, London, W.C.2.

POWER LINE DIVISION, (Department 2440) NORTH WOOLWICH, LONDON, E.16 Telephone : ALBERT DOCK 1401 (EXT. 796)

B4

S.W.S WASHBOILERS

★ RELIABLE
★ ROBUST
★ EFFICIENT

Here is a series of washboilers designed to meet the requirements of the user and maintenance engineer.

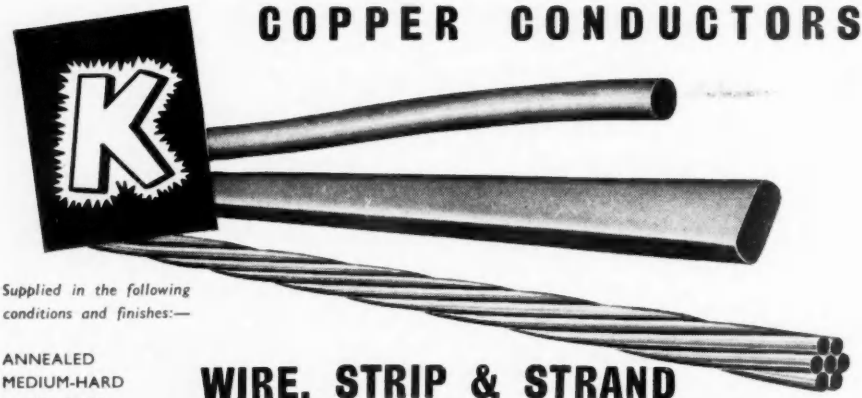
A special feature is the Hand Agitator Unit which is a unique addition for all S.W.S. Washboilers and is available from stock.

Write for leaflets and prices to—

SOUTH WALES SWITCHGEAR LIMITED

BLACKWOOD · MONMOUTHSHIRE

COPPER CONDUCTORS



Supplied in the following conditions and finishes:—

ANNEALED
MEDIUM-HARD
HARD, BARE
TINNED, COTTON
PAPER OR
ASBESTOS COVERED

WIRE, STRIP & STRAND

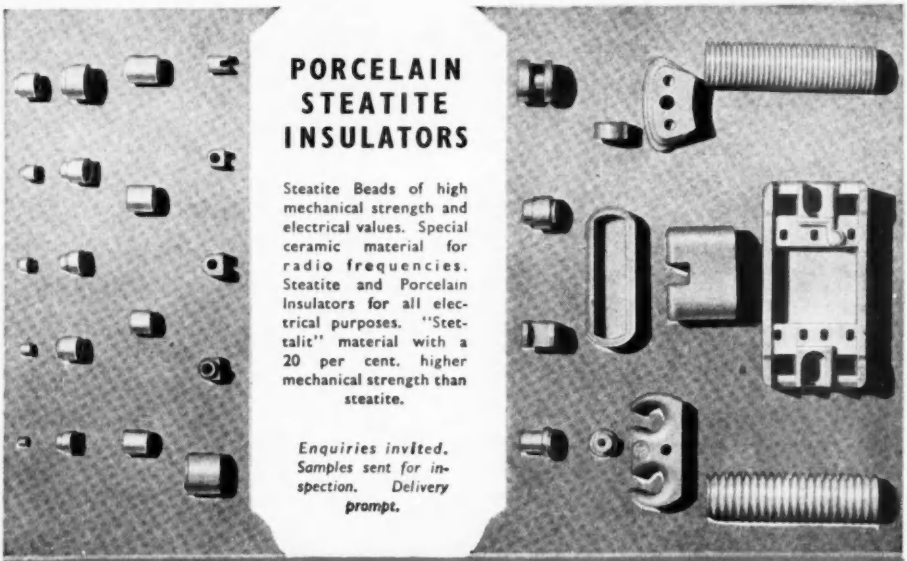
Please write for detailed leaflet 'ELECTRICAL COPPER CONDUCTORS'
We also manufacture Aluminium and Light Alloys in Bars, Tubes and Sections

also ALUMINIUM CONDUCTORS

E. & E. KAYE LTD.
PONDERS END · ENFIELD · MIDDLESEX

Telephone.. Howard 1601
Telegrams.. Cuwire, Enfield

T.A.2439



PORCELAIN STEATITE INSULATORS

Steatite Beads of high mechanical strength and electrical values. Special ceramic material for radio frequencies. Steatite and Porcelain Insulators for all electrical purposes. "Stettalit" material with a 20 per cent. higher mechanical strength than steatite.

Enquiries invited. Samples sent for inspection. Delivery prompt.

STEATITE INSULATIONS LTD. 25, SOMERSET RD., BIRMINGHAM 15
Phone: Edgbaston 3990

A loud warning before load shedding

Visible and audible warnings are given *before* a predetermined target load is exceeded, thus enabling effective action to be taken to reduce the load to the desired limit.

THE MAIN ADVANTAGES ARE

- Immediate indications of the percentage of total load to be shed on warning.
- Warnings are repeated at 5 minute intervals until load is adequately reduced.
- Target load setting easily adjustable and protected against unauthorized interference.
- Duration in minutes of any excess loads is automatically registered.

Chamberlain AND Hookham

PEAK LOAD SUPERVISOR

WRITE FOR CATALOGUE SECTION P.L.I.

CHAMBERLAIN AND HOOKHAM LTD., BIRMINGHAM

BUSBAR TRUNKING

IN INDUSTRY

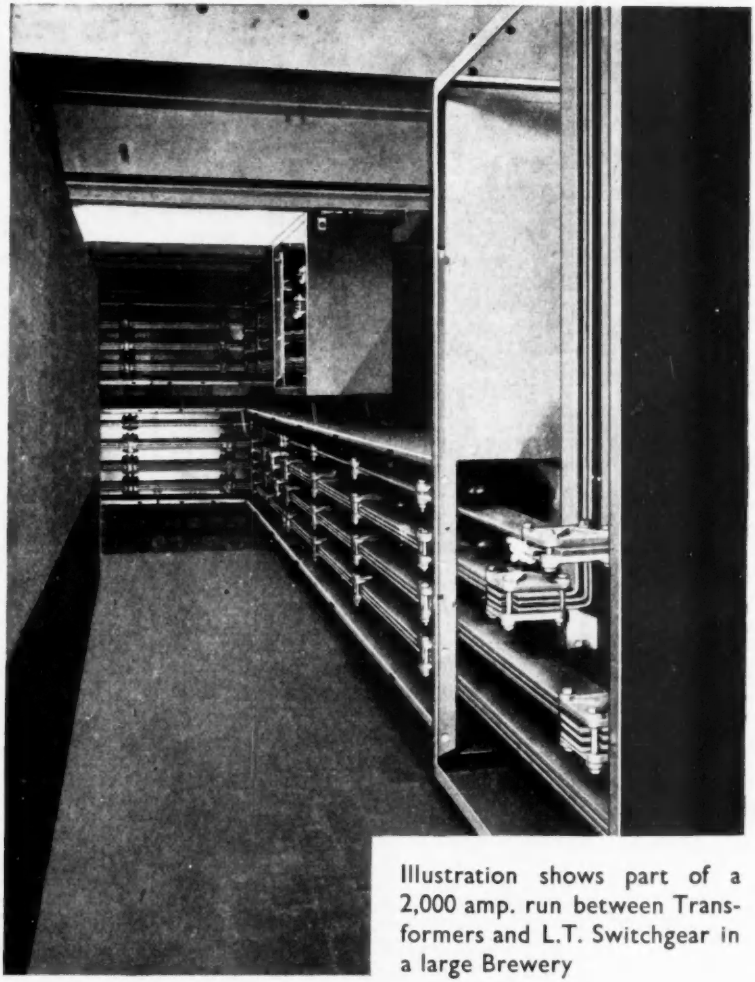
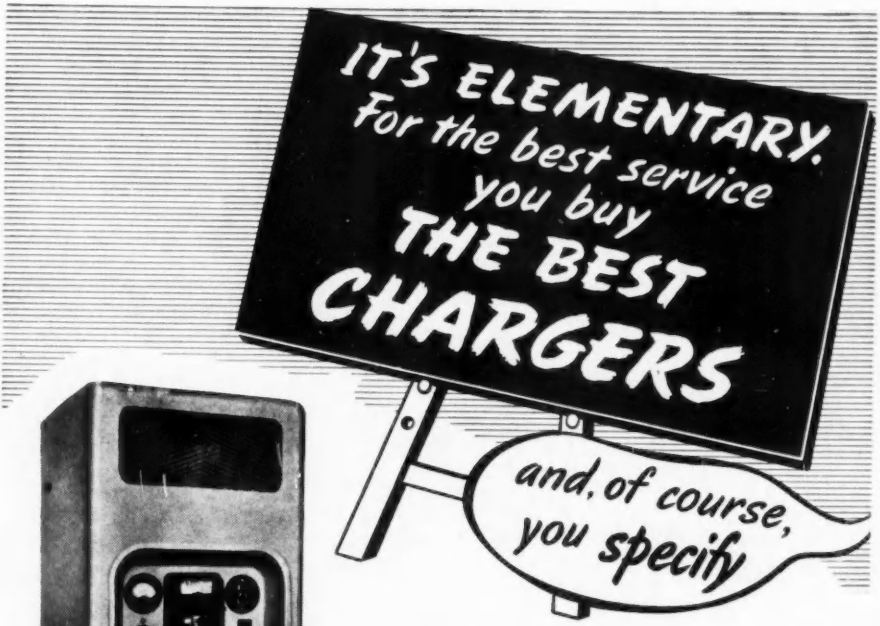


Illustration shows part of a 2,000 amp. run between Transformers and L.T. Switchgear in a large Brewery

London Office: Wellington House, 125/130 Strand, W.C.2
Telephone Temple Bar 1743

The Power Centre Co. Ltd.

Lloyd Street, Wednesbury,
Phone: Wednesbury 0507 Staffs. Grams: "Powcent" Wednesbury



. . . "Westalite" chargers. As the pioneers of metal rectifiers, we have dealt with so many problems of rectification that we have accumulated a vast amount of knowledge and experience. And from this background we have produced a range of vehicle battery chargers, incorporating double-voltage "Westalite" rectifiers, which we can justly claim to be unequalled in performance, efficiency and reliability. A feature is a transformer and choke designed to provide correct charging conditions, while allowing for likely mains voltage variations, which lengthens the life of the battery. As no maintenance is required and running costs are low, you can appreciate what an excellent proposition are . . .

WESTINGHOUSE

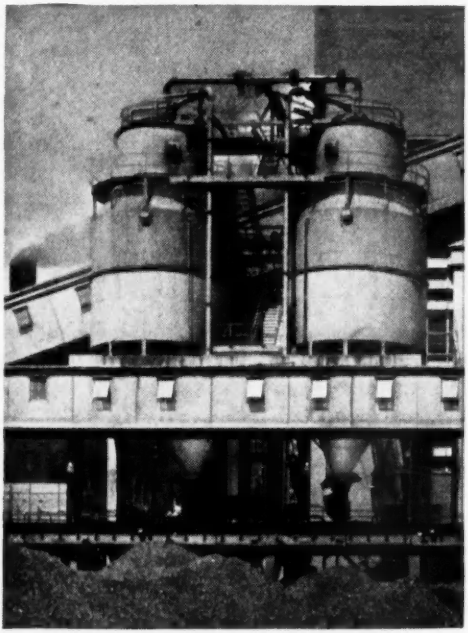
WESTALITE VEHICLE CHARGERS

DEPT. E.T.3. Write for publication M.R.12 to

WESTINGHOUSE BRAKE & SIGNAL CO. LTD.
82 York Way, King's Cross, London, N.1

FLUE DUST AND RIDDLINGS

EXTRACTION PLANT



● The Nation's need demands that Coal shall convert every possible fraction of its energy into power for production. The vital contribution that efficient combustion makes to this end is immeasurably facilitated by B.V.C. Flue Dust Removal Plant. This is the recognised method of keeping steam boilers free from accumulations of flue dust, and ensuring that every ton of coal is used to the best possible advantage by removing and consuming the riddlings.

For Information and Consultation write to Dept. 14

B.V.C. INDUSTRIAL CONSTRUCTIONS LTD

(Subsidiary of the British Vacuum Cleaner and Engineering Co., Ltd.)

Terminal House, 52 Grosvenor Gardens, London, S.W.1. Sloan 9975/8. Head Office: Leatherhead, Surrey

The imprint of his thumb in soft clay signified the potter's pride in work well done—a traditional mark of craftsmanship now replaced by the pressure of intricate dies, and the dexterity of female fingers manipulating them, producing in prolific quantity the myriad forms of porcelains used in every day electrical requirements.

Fine Porcelains, bearing that impress of Quality by which all Taylor Tunnicliff products are universally recognised.

Taylor Tunnicliff & Co Ltd.

Die Made Porcelains

Head Office EASTWOOD · HANLEY · STAFFS

Telephone : Stoke-on-Trent 5272-4

London Office : 125 HIGH HOLBORN W.C.1 *Telephone* : HOLborn 1951/2

VENNER

switches- automatically

NO CLOCK WATCHING

There is a VENNER time switch for every purpose.

'It's time you switched to Venner'

VENNER LIMITED

KINGSTON BY-PASS, NEW MALDEN, SURREY

TELEPHONE MALDEN 2442

ELECTRICAL TIMES

Vol. 121 No. 3143 THURSDAY, 31 JANUARY 1952

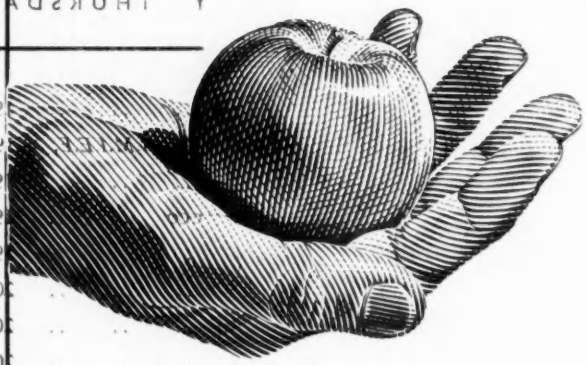
PUBLISHED EVERY THURSDAY

SIXTY-FIRST YEAR OF PUBLICATION

WANTED!—A POLICY ON FIRES 191
SUSPENSION INSULATOR LOADING *by L. J. Archer, B.Sc., A.R.C.Sc.I., A.M.I.E.E.* 193
OUR READERS' VIEWS 196
METROVICK COMPLETE FIRST BRITISH BUILT GAS TURBINE LOCO 197
HIGH VOLTAGE MEASUREMENTS 199
ALLENWOOD POWER STATION 200
PROBLEMS AND PRACTICE IN ENGINEERING 201
B.E.A.M.A. ENTERTAINS 202
PLANT IN NIGERIA, *by J. Mellanby, M.A., A.M.I.E.E., M.I.H.V.E., M.Inst.F.* .. 204
HEATING HOLME MOSS 207
PROGRESS IN PRODUCTION DURING 1951—BRITISH THOMSON-HOUSTON CO. LTD. 208
DUST DEPOSITION 211
UNTAPPED MARKETS 212
COOKERS FOR THE BLIND 213
OVERSEAS NEWS 214
PERSONALITIES IN THE INDUSTRY 216
NEW LITERATURE 218
THE BUYER'S COLUMN 219
BRITISH STANDARDS 221
HOTELYMPIA 1952 221
PARLIAMENT AND NATIONALISATION 222
LIGHTING A MOBILE FOOD HALL 222
THE WEEK IN NEWS 223
Electric Supply News 228
Company Activities 229
COMMERCIAL INFORMATION 230
CLASSIFIED ADVERTISEMENTS 55
INDEX TO ADVERTISERS 64

SUBSCRIPTION RATES.—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 9d. each.

OFFICES — SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telephone - HOLborn 6016 Telegrams - Equivolt, Estrand, London



Pick of the bunch

It is easy to pick out the best fruit. The quality of electric lamps, however, is not so obvious. They all look alike. But you will always be right to stock and use Osram. They are made by the G.E.C., the largest British electrical manufacturing organisation. All the vast technical resources and practical experience of this great firm are intimately associated with Osram lamps at every stage of manufacture.

Osram *the wonderful lamp*

FLUORESCENT

A G.E.C. PRODUCT

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE KINGSWAY, LONDON, W.C.2

Editorial

COUNTER-ATTACK

ELECTRIC fires have long been under attack, but recently the campaign against them has noticeably increased. From every side the attack has grown in intensity, yet no authoritative defence of the electric fire has been forthcoming. Can it be wondered that the public are beginning to accept all the misleading and erroneous statements about the electric fire? It was with a view to awakening the industry to the type of statement that is current, that we printed last week the article by Professor Simon; it is against this background that we present a challenge to the industry this week—a challenge to disentangle itself from the web of officialdom and to get on with its job of selling electricity. The British Electricity Authority must in the immediate future face up to this problem, and only when it can speak with an authoritative and unanimous voice on the subject, will the case for the electric fire be put in its proper perspective before the public.

DOLLARS FROM THE PUBLIC

IT is not only in this country that public authorities are hedged around in their purchasing activities by restrictions designed to ensure support for official policy. American federal, state and municipal agencies are no exception, and unfamiliarity with the procedure imposed on them, together with memories of some unfortunate experiences, has in the past kept most British manufacturers from attempting to sell to these wealthy customers. The very magnitude of their annual expenditure, however, makes a new effort to trade with them worth while, and the facts as to ways and means which the Board of Trade has assembled in a publication reviewed elsewhere in this issue, should encourage such an attack. "Buy American" legislation, which exists, is thought unlikely to present the impenetrable barrier that might be expected; forceful selling backed by carefully planned propaganda, should be able to pierce through it. That seems to be the essential message of this most important document, which may help British manufacturers to extend their activities in a market worth a total £5,000 m/year.

ANTI-CONSUMPTION TAX

THE suggestion of a tax on electricity is no new theme, but we must confess to some surprise on reading in the *Economist* the reasons for which they urge such a tax at the present time. Both coal and electricity are in short supply, it is argued, and in order to make the price mechanism work, they should both be made dearer. In the case of coal, the increase would be passed on to the miners to act as an incentive to more production, but not so in the case of electricity, since the output of power stations is limited by the plant, not the unwillingness of staffs to work harder. The extra income derived in this way would then happily be paid over to the Treasury, although a limited amount may be benevolently left with the B.E.A. to help finance investment programmes. The most significant factor of this suggestion is its demonstration that even in responsible economic circles, the problems of electricity supply are not understood. The scheme is based on the erroneous premise that electricity is in short supply, in the same way as coal and other commodities. It is not, and any sharp increase in price, if it succeeded in reducing consumption, would do so mainly during the marginal hours when electricity is less urgently needed. It would do little or nothing to strike at the root problem, the peak load. The author also appears to have overlooked the effect of the higher coal cost on the price of electricity, some 40% of which is directly related to fuel. Mr. has, however, more than once pointed out that the Electricity Boards operate on too

narrow a financial margin to give the requisite stability, and some increase in price may be desirable in order to provide adequate reserves. To impose a deliberate restrictive tax is quite another matter.

RESUSCITATION THEORIES

FIRST requirement of any method of artificial respiration is that it should be well understood and simple of application. These merits the standard Schafer system possesses in the full, but in the last few years there has been discussion in medical circles of its efficiency relative to some other methods. Comparisons have been difficult to make, because the state of the body in which artificial respiration needs to be applied is not readily simulated. Now comes news from the United States that drugs are available which, it is claimed, make large-scale experiments possible. Tests so carried out are held to confirm the superiority of some other methods over Schafer, although it has to be noted that such evidence is not conclusive. It was presumably partly on the basis of such evidence that the American Red Cross adopted an arm-lift method to replace Schafer, and signs are not wanting that a renewed interest in the whole problem is building up. An International Red Cross meeting is scheduled to be held in Canada this summer, and there seems a good possibility that all aspects of artificial respiration will be discussed there. What transpires will be of first-rate interest to all who work in the industry, for only the qualified medical men can reliably pronounce on the pros and cons of the various systems advocated. In the meantime, the golden rule remains, to be thoroughly familiar with Schafer or whatever method is at present used, and to apply it promptly and persistently if the occasion should arise.

NO CHANGE

FOURTEEN years is a long gap for any "annual" function to experience, yet there was little sign of a break in continuity when the Beama dinner returned last week to its rightful place in the electrical calendar. Some of the speakers suggested that they were accorded more freedom of subject by the long interval than they would otherwise have had, but a consultation of the ELECTRICAL TIMES report of that pre-war function leads *Meteor* to doubt this. In those pre-war days both the chairman of Beama and the principal Government speaker took as the theme of their discourse the export trade; not surprisingly, this was the same topic that occupied speakers last Thursday. It says much for the continuing vitality of the industry that on both occasions, speakers had a proud record of which to boast. But the parallel, remarkable though it is, does not end here; the then President of the Board of Trade spoke on that distant evening, and towards the end of his remarks dealt with restrictions on trade. And which did he pick out as the most serious, "making trade almost impossible"? None other than the currency restrictions being imposed by foreign countries.

REPLACE WHEN EXHAUSTED

IN these days, when pessimists dwell alarmingly on the rate at which coal, oil and many metalliferous minerals are being used up, it was stimulating and reassuring to hear Sir GEORGE NELSON present the optimistic industrialist's view. Stated briefly, it was a faith in the ability of science, backed by technology, to rise to the occasion. Materials which we regard as the starting points for many of our processes were formed from simpler matter, and in some cases their formation involved great quantities of energy being released. For all the startling advances made of late, the fertile minds of scientists can think of many likely possibilities of energy production and material extraction still to be exploited. The probability of significant progress in such fields must be borne in mind when prophecies of a fuelless, metal-starved future are encountered. And there is something particularly reassuring for the electrical engineer in the thought that his particular skill is likely to be called into play if such prospects materialise.

Meteor

WANTED!
- a policy on fires -

Too long has the Industry lacked a Lead on Domestic Electric Fires and a Spokesman to answer the Critics

THE time has come when the electricity supply industry must give a clear and unequivocal statement on its policy regarding the domestic electric fire. Too long has the industry's over-preoccupation with plant shortage given rise to a vacillation which has provided its competitors with a ready-made opportunity for malignment; an opportunity which has been exploited to the full. From all quarters comes the criticism, the fashionable contumely of the electric fire. It comes from such diverse publications as the *Midland Bank Magazine* and *Picture Post*, from politicians and university professors and even a former Minister of Fuel went so far as to forecast the day when the domestic electric fire will be non-existent. With this witch hunt in full cry, the time is overdue when the electrical industry should give the lie to the great nonsense which is spoken of the electric fire.

From amongst the mass of irrelevancies and erroneous thinking of the critics, two charges are generally made which are deserving of more serious consideration.

1. Owing to the inherent limitation on thermal performance of power stations, the electric fire is not the best medium for the efficient employment of the nation's fuel.

2. In cold weather electric fires provide a substantial addition to the peak and therefore are not only uneconomic to supply but under present conditions of plant shortage lead to load-shedding with consequent disorganisation of industry.

It is the first of these points that is the principal argument of the proponents of solid fuel. Little was heard of it until under the stimulus of competition from gas and electricity, solid fuel appliances were designed of a substantially higher efficiency than the former wasteful grate. Let us freely admit that progress in this field has been outstanding, uttering the caution only that the performance of these modern grates and stoves is not always as good in service as laboratory tests indicate.

It is true to say, however, when properly installed—which may involve structural alterations—and given the right kind of fuel, with correct adjustment of air supply, the efficiency of utilisation of the heat in coal can be greater in these solid fuel stoves than in the case of electric fires supplied from thermal power stations. But to say no more than that is to lose sight of one other essential factor in the fuel economy of the country.

Burn the Fuel Available

Those in the electrical industry will be familiar, almost too familiar, with the argument that the fuel burned in power stations is largely of an inferior quality. And it is this class, enlarged by opencast cutting, that is not in seriously short supply. Further, as more and more mechanical coal-cutting machinery is introduced into the mines the percentage of small coal produced will increase and any national fuel policy must give full recognition to this fact. A study of the relative position of coal stocks will show at once that it is with the larger coal that the greatest shortage exists today, and in consequence it is essential to the national interest that this class of coal be conserved for those uses for which it is necessary and for bunkering and exports. Yet this point has never been forced on the attention of the public and of politicians. It is not a mere question of relative efficiency of heat conversion but of burning fuel which is available or not.

Even such a comparison, however, does not fully represent the facts, for it compares two methods of house heating as competitive, when it would be nearer the truth to say that they are complementary. This erroneous comparison arises largely from the use of that fashionable misnomer "space heating." This term, which originated from the solid fuel interests, was enthusiastically adopted by planners and civil servants, and even the B.E.A. has fallen into the snare of using it. The essential object of domestic heating is to warm persons—not space; and the difference is one which is in the interests of electricity to stress.

Any direct comparison of heating methods must include the method of usage and for intermittent use the electric fire is incomparably superior to solid fuel in its economy. One of

the new open solid fuel fires takes 6 lb. of fuel to start, quite apart from the gas used for ignition. For the same quantity of fuel, an electric fire could be run for three hours assuming 2 kW during the first hour and 1 kW subsequently. Thus the common domestic practice of using electric fires for occasional heating is well grounded on efficient utilisation of fuel; if anything, they are used far less frequently than they should be.

Unquestionably, therefore, from the fuel conservation point of view electricity is infinitely preferable to solid fuel for periods up to three to four hours. For long period heating the case is less clear cut for as we are considering only the efficiency of fuel conversion, such factors favouring electricity as cleanliness, simplicity and avoidance of structural costs must be excluded. But here again it is not just a direct comparison between laboratory test efficiencies of solid fuel equipment and the average thermal efficiency of fires (including station losses). Such factors as absence of draughts from the air required for combustion, the facility for strategic placing of heaters, the more economical use of heat achieved by thermostatic control and the absence of possible heat loss by bad stoking, all tend to even up any unbalance in relative efficiencies.

But when all the arguments have been heard one simple question remains. The consumption of coal equivalent to domestic electric heating is some 3·5 m. tons a year, only one-tenth of domestic coal requirements. Can therefore, the same standard of domestic heating throughout the country, as at present supplied by electricity, be provided by a similar quantity of a similar inferior fuel burned on solid fuel grates?

Domestic Fires not a peak load

We must now turn to the second question, the effect of domestic electric heating on peak loads. It is well known that cold weather brings a substantial increase in load which in the main is attributed to electric heating. For some unaccountable reason, the poor domestic consumer has been blamed for this, and the important factor of electric heating in factories and offices has been largely ignored.

As far as we are aware, there has been no recent survey to determine the peak incidence of domestic fires, a regrettable omission. The latest work, done in 1945, led to the view that the average load factor for domestic heating was of the order of 13%. Since then the whole picture of electric heating has altered. The severe shortages of solid fuel have led to increasing usage of electricity in order to conserve the consumers' individual stocks of fuel. This is particularly well demonstrated by the greater use of electric fires during a cool summer, but it is a factor which operates throughout the year. It is therefore reasonable to suppose that the load factor of electric heating today would be considerably higher than the figure given in 1945, which shows clearly that the popular concept of electric fires as providing solely a peak load is false.

The same investigations showed also that the consumption per kW installed increased as the size of the installation grew. What is more, it demonstrated conclusively that domestic heating provides the highest average consumption per consumer of any class of usage. Further, the very conditions which give rise to abnormal peaks, in themselves led to abnormal consumption. A cold spell will raise the whole level of the load curve and from some recent examples which we have had an opportunity of studying, the rise in average level of the off-peak load was higher than the increase in peak. In consequence, the effect of the greater heating load was to increase, not decrease, the daily load factor. When all these considerations are duly weighed it is pertinent to ask whether this is a load the industry can afford to neglect.

Revive selling once more

This view is not one lulled from the mild weather and relative absence of load-shedding this winter; it has been frequently urged in this paper. A proper consciousness of our peak problems is necessary to the industry but it should not so becloud our reason as to lead to policies which run counter to the whole tradition and economic livelihood of the industry. Because there is a shortage of coke and similar fuels, does the Ministry of Fuel depart from its advocacy of just these fuels, or the Ministry of Housing and Local Government modify by one jot its directive on the installation of coke-burning appliances in new council and private houses? Should, therefore, the industry hesitate when there is no basic shortage of electricity, but only some limit on the times of use?

Let us say outright that the industry is suffering from too many outside influences, and let it be admitted, also, a certain lukewarmness in certain quarters within it. The lip-service of banning sales of fires from showrooms when they are readily available in adjacent shops, is but one symbol of the malaise which has fallen upon the industry. What is needed is a reinjection of commercial vigour, of some risk-taking, and above all a full recognition once more that the primary purpose of the industry is to sell electricity.

Suspension Insulator Loading

An Analysis of those conditions controlling Insulator Swing

By L. J. ARCHER, B.Sc., A.R.C.Sc.I., A.M.I.E.E.

IT is usual for specifications concerning overhead lines on suspension insulators, to stipulate that the vertical loading on such insulators shall not be less than a prescribed amount, which is generally stated in terms of the adjacent span lengths.

With suspension sets not only is "uplift" not permissible but excessive insulator swing under a strong wind is objectionable as it will result in reduced clearances between live parts and the supporting structure. In order to make sure that the inclination which results from any given conditions does not exceed the permissible amount it is necessary to ensure that the ratio of the horizontal to the vertical forces acting at the suspension clamp is kept within certain limits. This may be done by arranging that the vertical load on any suspension set shall not be less than a given percentage of the total weight of the conductor in the two adjacent spans.

The value of the percentage chosen will depend upon the conditions of temperature and loading which it is desired to meet, and upon the permissible angle of inclination of the insulator string.

Factors Involved

First it is necessary to decide upon the minimum clearance which may be tolerated between live parts and the support. Then, having regard to the design of the support and fittings and the length of the insulator string, to determine θ, the maximum angle of swing.

The next thing to consider is the most onerous set of conditions likely to be met. This may be the conditions of maximum loading prescribed in El.C.53, or some other conditions, more or less severe, depending upon circumstances.

It will be understood that the weight carried by any support nearly always varies with the temperature. This will be the case unless three adjacent points of support lie on a straight line, in which case the centre support carries half the weight of the two spans at all temperatures. For any other relation between support heights the lowest point of the conductor in each span will shift along the line as the sag changes with temperature. The weight carried by a low support (which is, of course, the lightly loaded one) will be less at low temperatures than at high ones.

It is for this reason that it is necessary to stipulate the temperature at which the condition of minimum loading shall apply.

Determination of Permissible Minimum Loading

Let P be the horizontal force which will act upon the clamp due to the wind on the conductor and W be the weight which the clamp supports. That is to say W is the minimum permissible loading which is to be determined.

It follows that $W = P \cot \theta$.

The value of P is readily determined as it is

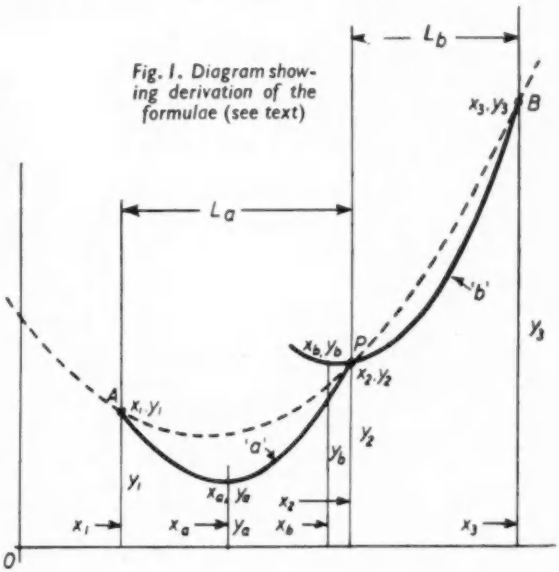


Fig. 1. Diagram showing derivation of the formulae (see text)

equal to $\frac{p}{2}(L_a+L_b)$, where p is the wind pressure per foot on the conductor and L_a and L_b are the lengths in feet of the adjacent spans. The value of p will, of course, depend on the assumed wind force and upon the conductor diameter and the thickness of ice load, if any.

Writing $W=\frac{p}{2}(L_a+L_b)\cot\theta$, this is easily expressed as a fraction or percentage of $w(L_a+L_b)$, the weight of the conductor in the two spans. Here w is the weight per foot of the conductor, with any ice load included in the conditions to be considered.

Finally then the expression becomes:—

$$W=\frac{p\cot\theta}{2w}(L_a+L_b)\,w=k\,(L_a+L_b)w \quad \ldots\ldots(1)$$

Meeting the Condition

It now remains to decide how this requirement that W shall not be less than $k(L_a+L_b)w$ is to be met in practice.

The question is one of determining the relative levels of the points of support which will fulfill this obligation.

Referring to the figure, in which A, P, and B are three points of support and "a" and "b" the two adjacent spans, it is seen that

$$L_a=x_2-x_1$$

and $L_b=x_3-x_2$, from which equation (1) may be re-written

$$W=kw(x_2-x_1+x_3-x_2) \quad \ldots\ldots(2)$$

It should be noted that the co-ordinates refer to an arbitrary origin O and the resulting equations are quite general. It is assumed that the curves representing the conductor are parabolae, in accordance with the usually accepted approximation for spans of normal length.

The equations of the two parabolae "a" and "b" are:—

$$y-y_a=c(x-x_a)^2 \quad \ldots\ldots(3)$$

$$y-y_b=c(x-x_b)^2 \quad \ldots\ldots(4)$$

The value of the constant c depends on the weight and tension of the conductor, and since the support P has suspension insulators the tension must be the same in both spans and c is therefore the same in each equation.

Now x_a, y_a and x_b, y_b are the co-ordinates of the vertices of the two parabolae and are therefore constant for any given conditions.

It is then required to find the positions of A, P and B for which the loading at P shall equal W.

The vertical loading at P due to span "a" is due to the weight of conductor in the "effective" half-span i.e. from P to the vertex of "a". In accordance with the parabolic approximation this is taken as $w(x_2-x_a)$. Similarly the weight due to span "b" is $w(x_b-x_2)$. For the particular arrangement illustrated this is in fact negative, i.e. the span is exerting an upward pull at P; but as previously mentioned the equation is quite general.

Thus the total vertical load on P is

$$W=w(x_2-x_a)+w(x_b-x_2) \quad \ldots\ldots(5)$$

From equation (3) we can write for span "a" at support A

$$(y_1-y_a)=c(x_1-x_a)^2$$

and at support P $(y_2-y_a)=c(x_2-x_a)^2$

subtracting gives

$$y_2-y_1=c[(x_2-x_1)(x_2+x_1-2x_a)]$$

from which $x_2+x_1-2x_a=\frac{y_2-y_1}{c(x_2-x_1)}$

or $x_2-x_a=\frac{y_2-y_1}{c(x_2-x_1)}+x_a-x_1$

adding x_2-x_a to each side and dividing by 2 gives:—

$$x_2-x_a=\frac{y_2-y_1}{2c(x_2-x_1)}+\frac{x_2-x_1}{2} \quad \ldots\ldots(6)$$

Similarly for span "b" from equation (4) it may be shown that

$$x_2-x_b=\frac{y_3-y_2}{2c(x_3-x_2)}-\frac{x_3-x_2}{2} \quad \ldots\ldots(7)$$

and inserting these values in equation (5) yields

$$W=\frac{w}{2c}\left(\frac{y_2-y_1}{x_2-x_1}-\frac{y_3-y_2}{x_3-x_2}\right)+\frac{w}{2}(x_2-x_1+x_3-x_2) \quad \ldots\ldots(8)$$

Equating this value for W to that in equation (2) $k(x_2-x_1+x_3-x_2)=$

$$\frac{1}{2c}\left(\frac{y_2-y_1}{x_2-x_1}-\frac{y_3-y_2}{x_3-x_2}\right)+\frac{1}{2}(x_2-x_1+x_3-x_2)$$

or $c(2k-1)(x_2-x_1+x_3-x_2)=\frac{y_2-y_1}{x_2-x_1}-\frac{y_3-y_2}{x_3-x_2}$

or $\frac{y_2-y_1}{x_2-x_1}-\frac{y_3-y_2}{x_3-x_2}=c(1-2k)\{(x_2+x_1)-(x_3+x_2)\}$

for $c(1-2k)$ write c'

and $\frac{y_2-y_1}{x_2-x_1}-\frac{y_3-y_2}{x_3-x_2}=c'\{(x_2+x_1)-(x_3+x_2)\}$ . . (9)

This equation will hold if simultaneously:—

$$\left.\begin{aligned}\frac{y_2-y_1}{x_2-x_1}&=c'(x_2+x_1)\\ \frac{y_3-y_2}{x_3-x_2}&=c'(x_3+x_2)\end{aligned}\right\}$$

or, multiplying across in respective equations, if

$$\left.\begin{aligned}y_2-y_1&=c'(x_2^2-x_1^2)\\ y_3-y_2&=c'(x_3^2-x_2^2)\end{aligned}\right\} \quad \ldots\ldots(10)$$

These equations (10) again hold if simultaneously:—

$$\left.\begin{aligned} y_1 &= c'x_1^2 \\ y_2 &= c'x_2^2 \\ y_3 &= c'x_3^2 \end{aligned}\right\}$$

that is to say if A, P and B lie on the parabola

$$y = c'x^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (11)$$

in which $c' = c(1-2k)$.

From equation (1) it may be seen that

$$c' = c\left(1 - \frac{p \cot \theta}{w}\right) \quad \ldots\ldots\ldots\ldots\ldots\ldots (12)$$

The dotted curve in the figure is the parabola $y = c'x^2$, and, as shown above, the loading at P equals W.

For points of support lying above the curve the loading will exceed W while for points below the curve the loading will be less than W. Consequently in order to satisfy the condition that the loading shall be not less than W the point P must not lie below the curve.

Evaluation of Constants

Using the parabolic approximation as in the foregoing, the equation for the conductor sag is $s = wL^2/8T$, where s is the sag and T the horizontal tension in the conductor. L and w have the same significance as before. The sag equation may be re-written

$y = wx^2/2T$

from which we see that c in equations (3), (4) and (12) is equal to $\frac{w}{2T}$

$$\text{Thus } c' = \frac{w}{2T}\left[1 - \frac{p \cot \theta}{w}\right]$$

$$= \frac{1}{2T}(w - p \cot \theta)$$

$$\ldots\ldots\ldots\ldots\ldots\ldots (13)$$

Typical Example

Suppose that it is intended to erect a 0·15 sq in. (7/0·166 in.) H.D. copper conductor on suspension insulators, and that the design of the supports, etc., makes it undesirable to permit the insulators to swing beyond 45°. Suppose also that the anticipated conditions are such that it is decided to apply the loadings specified in El.C.53 for this purpose as well.

In order to determine the tension to be used in equation (13) it is necessary to fix on a span length. The value of the tension will, of course, vary according to the equivalent span of the section. Since, however, the condition to be investigated is not highly critical, and no serious error will result from slight inaccuracies in the value of T, it is suggested that it will be sufficient to use a value which corresponds with the probable average span length of the proposed line. Let us suppose that this is 500 ft.

The tension required is that in the *loaded* conductor in *still air* at 22° F. It is important that this value be used, not the value corresponding to the wind loaded condition as the value of W required is the vertical load on the support not the resultant load.

Accordingly we have:

$p = 0{\cdot}832$ lb/ft (wind load)

$w = 1{\cdot}00$ lb/ft (weight of conductor, plus ice)

$\text{Cot } \theta = 1$

T = 3,700 lb (tension at 22° F. with ice load based on 500 ft span)

(It is assumed that the conductor is erected so as to have a factor of safety of two with conditions as El.C.53.)

First from equation (1)

$$W = \frac{0{\cdot}832}{2} - (L_1 + L_2)w$$

$$= 0{\cdot}416\,(L_1 + L_2)w$$

or 41·6% of the weight of ice loaded conductor in two adjacent spans, and $k = 0{\cdot}416$.

Next the equation of the parabola on which the supports must lie to satisfy the desired condition is $y = c(1-2k)x^2$

where $c = w/2T = 1/7400$

$$\therefore y = \frac{1}{7400}(1 - 0{\cdot}832)x^2 = 2{\cdot}27 \times 10^{-5}x^2$$

Other Conditions

It will be interesting to investigate the vertical insulator loading and swing which will result when the conductor is unloaded in a wind of the same force at 22° F.

In this case $w' = 0{\cdot}594$ lb/ft

$p' = 0{\cdot}34$ lb/ft

and $T' = 2861$ lb. (still air tension).

Since the support heights are unaltered they still lie on the curve $y = 2{\cdot}27 \times 10^{-5}x^2$ which is to say $c'(1-2k') = 2{\cdot}27 \times 10^{-5}$.

Now $c' = w'/2T'$, from which k′ is found to be 0·39.

$$\text{Thus } \frac{p' \cot \theta'}{2w'} = 0{\cdot}39$$

or $\cot \theta' = 1{\cdot}361$ and $\theta' = 36°$.

Minimum Loading Condition

So if it is desired to express the minimum loading at 22° F. in terms of the weight of *unloaded* conductor the condition is that the weight supported at any suspension insulator at 22° F. should not be less than 39% of the total weight of conductor in the two adjacent spans. Under this condition the insulators will not swing more than 36° from the vertical. Under the wind and ice loaded conditions the swing will, of course, be 45° as already decided.

Had the conductor been 0·1 sq in. H.D. copper for which w=0·764 and p=0·772 (both under ice-loaded condition) we should have, from (1), W=0·488 $(L_1+L_2)w$, i.e. W is 49% of $(L_1+L_2)w$ (approx.).

When the points of support are level or lie on a straight line W is 50% of $(L_1+L_2)w$. It is readily seen, therefore, that if no more than a 45° insulator swing is permissible under wind and ice load as El.C.53, practically no irregularity in support heights can be permitted. This is a condition which obviously cannot generally be met!

For even smaller conductors W will be greater than 50% of the total weight in the adjacent spans, clearly an impossible condition.

It may thus be necessary so to design dropper fittings and crossarms that a wide angle of swing is permissible. The possibility of an insulator string becoming unhooked if wide swings occur must be born in mind, and in such cases correct fittings should be chosen.

In some cases weights have been attached to the suspension clamp in order to limit insulator swing.

Our readers' views . . .

Fuel Saving

WOULD Professor Simon please give us his estimate of the saving in coal consumption which would be achieved if miners had the same coal ration as the rest of us? As long as one section of the community gets lavish issues of concessionary coal, appeals to the rest to burn fuel economically will tend to go unheeded. Let those who win the coal show they appreciate how valuable it is by installing these up-to-date grates in their own homes. They will then not need such excessive issues as they now get—in fact there will be a double saving—and the rest of the community will have the right kind of fuel leadership (example coupled with exhortation), and will feel impelled to follow suit.

May I add I use these modern grates in my own home because they help me to eke out the exiguous ration—and I suggest it's about time that three-quarters of a million miners did some eking out too.

A. N. D. Kerr

ORPINGTON

* * *

Troubles and Remedies

REFERRING to the article by Mr. Spence in your December 20 issue on the maintenance of d.c. generators, there is some ambiguity in connection with Note 6, relating to brush potential curves since the "leading" edge of the brush is not defined. Such a definition is important, as it is a vital factor in the interpretation of the curves when plotted as in Fig. 4, and it is generally considered to be the edge of the brush which first makes contact with any commutator segment. If Mr. Spence also uses this definition, then Fig. 4 is not correct-4b and 4c relate to over and under commutation conditions respectively, i.e. the reverse of that shown in the original article.

A similar difficulty may arise in interpreting the instruction to "advance" or "retard" the brush rocker, but in the instance all doubt is removed by Mr. Spence referring to "movement forward (in the direction of rotation)."

V. Easton

BIRMINGHAM

* * *

Discouraging Maintenance

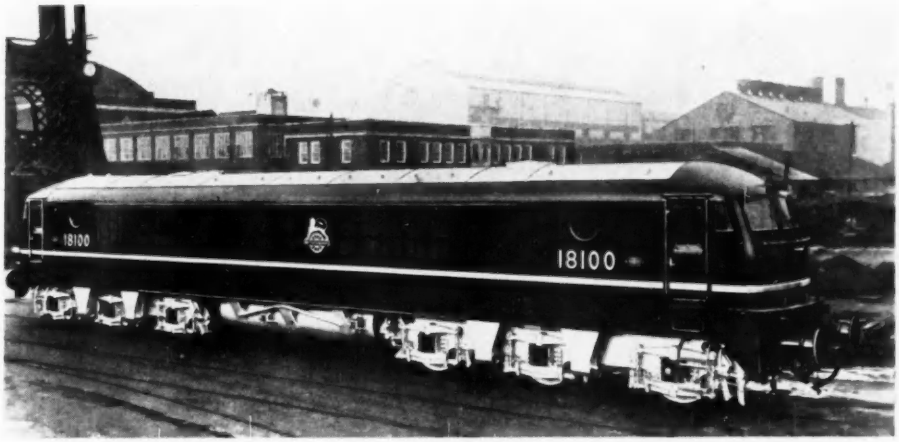
I HAVE recently seen a Safety Precautions Card, issued by H.M. Stationery Office for use in Domestic Science rooms. It contains this sentence—"Rubber mats must be supplied for use at electric stoves placed on concrete." Not a word about periodical maintenance, not a word about the care of flexibles

The safety of the user has always been my prime concern, and therefore I am not one for minimising safety precautions, however small the reward. But, having seen most things that can happen to an electric cooker, I think the reward in this case may quite easily be negative. It does not increase the intrinsic safety of the apparatus and may conceivably have the opposite effect by encouraging carelessness in the matter of maintenance. The only positive result in my opinion would be the unwarranted impression created in the minds of the students.

If I am wrong, if this precaution is warranted, the sooner we have 110 volts distribution the better.

Geo. H. Currie

LIVERPOO



Metrovick Complete First British Built Gas Turbine Loco

THE first British gas-turbo-electric locomotive, No. 18100, was shown to the Press for the first time at Paddington on Tuesday, January 29. This powerful engine rated at 3,000 h.p. in its present form, is suitable for hauling the heaviest passenger trains on the Western main routes, particularly that between London and Plymouth, at speeds up to 90 m.p.h. Financial and technical responsibility for the project is shared by British Railways and Metropolitan-Vickers Electrical Co., Ltd., who designed and built the unit.

Plant Arrangement

The body structure contains the power plant and a driving cab at each end; it is carried on the two bogies by swing links resiliently attached by rubber resilient universal joints to permit controlled swing bolster action and bogie pivoting, without the use of actual bolsters which would have required more space than was available between the bogie frames and within the fixed wheelbase.

Each bogie has three driving axles, each driven through a single reduction gear by a traction motor suspended on the axle and from a support on the bogie frame.

The turbine rotates at 7,000 r.p.m. when delivering full load, and drives three main traction generators at 1,600 r.p.m. through single reduction gearing. The reduction gear unit has two output shafts; one drives two of the main generators in tandem and the other drives the third main generator, the auxiliary generator and the exciter. The turbine, reduction gear and group of generators are mounted on a common bedplate together with the main fuel and lubricant pumps and constitute a self-contained power unit which is installed in the locomotive body on three support points on its main underframes.

Each of the three main generators supplies two of the six traction motors. The motors of each pair are connected permanently in parallel.

From the turbine output of 3,000 h.p., an allowance of about 150 h.p. provides for the loss in the reduction gear and the demands of the locomotive auxiliary equipment, leaving 2,850 h.p. input to the traction generators. Over most of the speed range of the locomotive an electric transmission efficiency of about 86% is achieved corresponding to 2,450 h.p. at the rails. This power is sufficient to give an 18-coach train balancing speeds of 85 m.p.h. on the level, and 41 m.p.h. and 23 m.p.h. respectively when climbing gradients of 1/100 and 1/50.

A turbine full load thermal efficiency of 19% has been demonstrated on test; when account is taken of the gear and electrical losses, the overall thermal efficiency of the locomotive becomes 16%. After deduction of the 75 h.p. required for auxiliaries, the remaining traction power available at the wheels represents 15½%

The driver's cab is comfortable and clean

of the heat value of fuel consumed or a fuel rate of 0·88 lb per h.p. hr. At half power this rate will rise to about 1·3 lb.

Control

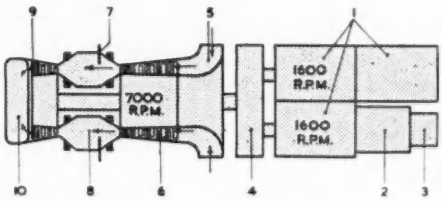
To start the unit, the turbine is accelerated up to a self-sustaining speed by the main generators acting as motors fed from the starting battery, and once the driver has actuated the starting button the process is entirely automatic. Full power may be taken from the turbine after about 10 minutes warming up at idling speed or at low power.

Control of the tractive effort, fields, turbine speed and other functions is largely automatic. The general method is to relate to each quantity to be measured a proportionate voltage and to cause that voltage to control relays and electric servo mechanisms for adjusting the quantity to the required value.

The sequence and timing of the various events in the process of starting the turbine are determined by a drum type sequence controller, driven by an electric motor. Similar means are employed to regulate the periodic running of the turbine during cooling.

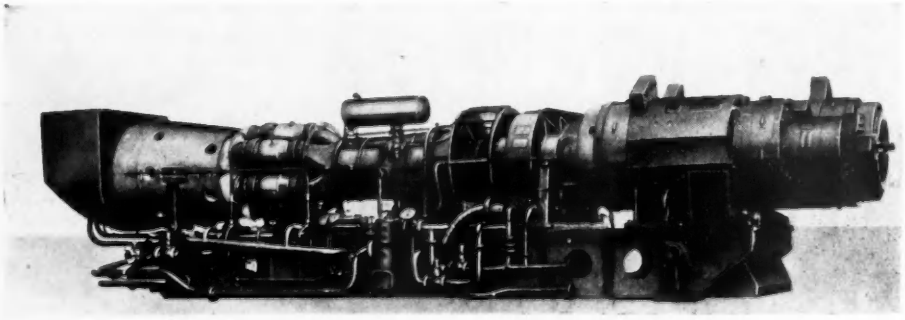
For starting purposes a battery, consisting of 48 lead-acid cells of 384 ampere hours is provided, and this is used to motor the main generators. In the event, however, of the battery being discharged, the electrical connections may be altered to enable the traction motors to generate the necessary power when the unit is pushed or pulled by another loco.

In the main power circuits the equipment used is similar to that generally used in electric locomotives, and is electro pneumatically operated.



In this schematic arrangement of the engine, the following components are shown; (1) three main generators; (2) auxiliary generator; (3) exciter for main generator; (4) gear box input 7,000 r.p.m., output 1,600 r.p.m.; (5) air intake; (6) compressor; (7) fuel injection nozzles; (8) combustion chambers; (9) turbine, and (10) turbine exhaust

Side view of power unit including combustion chamber, turbine compressor and generator on the bedplate



High-Voltage Measurements

Methods of Testing discussed at the I.E.E.

OPENING a discussion on "High-Voltage Measurements and Tests" at the I.E.E. last Tuesday, January 22, Dr. J. S. Forrest pointed out that when dealing with high voltages many factors were involved which did not apply with equal force to low-voltage work. In the first case, special precautions had to be taken to safeguard the operator against electric shock. This meant that in many cases the measuring instrument could not be applied directly to the high-voltage circuit, and thus errors could be introduced due to the method of coupling. In special cases, however, it was possible to connect the instrument to the high-voltage circuit and operate it from a safe distance. An alternative method was to enclose both operator and instrument in a Faraday cage insulated from earth.

Secondly, errors could be introduced due to electrostatic induction from the high-voltage conductors, and special arrangements for screening might therefore be needed. Finally, the high-voltage parts of the measuring instrument, where it was connected to the system under test, had to present a high impedance to the system, to be free from corona, and be able to withstand the high voltage being measured without difficulty.

Types of Measurement

The factors usually requiring measurement in high-voltage systems were power frequency and surge voltages; load current, power, reactive power and energy; waveform, insulation leakage and discharge phenomena.

Generally speaking, high-voltage tests should reproduce the stresses which the apparatus under test would suffer in service. It was, however, sometimes expedient and in practice satisfactory, to depart from this principle, as for example, when direct current was used to test a.c. equipment. Careful consideration should be given to the value and time of application of the test voltage. More realistic information, for example, was often derived from a long duration test at the working voltage, than from the application of a much higher voltage for a shorter time such as one minute. Accordingly, there was a tendency to replace the traditional "pressure test" by a long duration test at moderate voltages supplemented by an impulse test.

Voltage and current transformers were costly items of equipment on high-voltage systems and there was scope for the development of less expensive methods of stepping down voltages and currents in correct ratio and phase angle.

Discharge phenomena were of importance in connection with insulation testing as they provided one of the most sensitive methods of detecting faulty insulation. The interpretation of discharge measurements was not easy, and it was sometimes difficult to decide if a discharge was dangerous or innocuous. In field testing it was also difficult in some cases to identify the discharge as occurring in the insulator under test.

Dr. Forrest concluded his remarks by commenting on the accuracy of instruments.

Impulse Testing

Dr. H. Tropper, dealt specifically with the problems associated with impulse testing. No special difficulties were encountered when a cathode ray oscillograph was used for recording 1/50 impulse voltages, or for the measuring of the breakdown voltage obtained with such impulses, provided the breakdown took place after the crest value had been reached.

For such relatively slow transients the resistance type of voltage divider was ideally suited to reduce the high voltages to values suitable for the cathode ray oscillograph. Its resistance could be accurately measured and the voltage ratio reduced. The distributed inductance and self capacitance of the voltage divider could be neglected under these conditions, but care should be taken to minimise stray capacitance to earth.

A much more difficult task was the measurement of chopped impulses which had durations of less than one microsec. For this type of work, the simple resistance voltage divider was inaccurate because of the effect of earth capacitance. It was suggested that the way to neutralise this effect was to control the capacitances in such a way that by themselves they caused a voltage distribution identical with that produced by the resistance divider alone. This could be done by adding capacitances of suitably graded values in parallel with the resistance column, and thus constructing a mixed resistance capacitance divider, or by

shaping the high voltage electrode so that it controlled the voltage distribution correctly.

General Discussion

The possibility of impulse tests displacing the traditional 50 c/s tests was referred to by most of the twelve speakers who entered the discussion. The majority did not think that the traditional tests would be found superfluous, either by manufacturers or customers. It was noted that if impulse tests only had to be considered, economies in materials and construction would become possible with some equipment, but a speaker observed that in the case of transformers the stress distribution at 50 c/s differed from that under surge.

The correct interpretation of discharge tests was discussed. One speaker considered them to be valuable and sensitive. An indication was given of experiments which were being conducted by E.R.A. The results described related mostly to polythene and similar materials having low power factors.

Other experiments by E.R.A. were referred to by another speaker, who said that measurements at substations and automatic oscillograph records showed that, at the terminals of a 132 kV transformer, the peak voltage encountered could attain 230% of normal. This figure was reached when de-energising the transformer, and exceeded the values caused by any other occurrence, including lightning. Energising gave a figure of 180%.

The discussion of voltage dividers showed a general preference for the capacitor type. One speaker adduced particular reasons for this preference when making tests with chopped waves, but a method was explained of compensating for errors by screening the capacitor divider by a high voltage electrode, thus distributing the voltage more equally along the divider and reducing the error to within 3%.

Mr. F. J. Lane (Measurement Section chairman) took the chair, and was supported by Mr. R. Davis, chairman of the Supply Section.

ALLENWOOD POWER STATION

ALLENWOOD power station of the Electricity Supply Board, Eire, is peat burning and has an installation of two 20,000 kW turbo-alternators and four boilers, each having a capacity of 150,000 lb of steam per hour m.c.r. Cooling of the circulating water is effected by a reinforced concrete cooling tower 285 ft high, 196 ft diameter at the base and 128 ft diameter at the top. The tower is capable of cooling water for three 20,000 kW turbo-alternators. The present peat store adjoining the station has a storage capacity for 40,000 tons of peat, which can be extended to give a storage area for an additional 28,000 tons.

Make-up water is pumped from the navigation canal about three-quarters of a mile distant. Water for the cooling tower is also taken from the canal at the same position and, here the quantity used is relatively small, as it is circulated from the tower to the condensers at the turbo-alternators and back to the tower again.

The power station, cooling tower, coal store and other auxiliary equipment for the station occupy an area of about 34 acres.

In commission this station will consume 180,000 tons of peat to produce 120 million units per annum.

Problems and Practice
IN ENGINEERING

Microscopic Fault

T. McG.'s experience described by him under the above title in the issue of Jan. 3 last was well worthy of publication, and it can be enlarged upon. In electrical work, one only too soon finds that "a miss is as good as a mile" and a "bad connection" can take many puzzling and exasperating forms. It is by no means unusual for a physical check of one kind or another to show an o.k. condition, and an open circuit to be then fruitlessly looked for elsewhere.

In its early stage the fracture in a conductor may not easily be perceived; later it fills either with dirt or with non-conducting foreign matter set up by flashing—and this filling can not only worsen conductivity, but may camouflage the widening gap. Temperature variations give baffling effects by making a crack open and close; but sooner or later, after the current has been cut off for a time, supply cannot be resumed. Circuits at extra-low voltage are naturally more critically affected by the failing; a current transformer's secondary circuit can, however, tide itself over for a time owing to the rise of voltage which can occur. Thus one has found by experience not only the lug cracks of T. McG.'s machine, but examples such as faulty connections due to indifferent soldering, brazing or welding; cracked bolts; and even the neutral links in single-phase electricity meters (quite a long run of these latter !). And, closely related, there are such faults as the bad contacts in screwed connections of diverse forms, knife switches, fusible cut-outs, and terminals of all kinds—each of these (to all appearance) in good order. No wonder you see old hands unconsciously tightening-up connections !—*G.E.M.*

Two Motor Faults

A PLANT attendant reported that a 230 V motor driving a small pump appeared to be heating up excessively. Control was effected by a starting panel of the shunt regulator type having an interlocked isolator, supply being taken from a 30 amp sub d.b. The electrician reported that subsequent to removing the fuses he had received a severe shock from the isolator contacts of the starting panel. Arrangements were made to isolate the d.b. supply and a thorough investigation was made. It was found that the slack portion of the wire connected to the live pole had been pinched against the busbar, which had cut through the insulation, thereby shunting the fuse. After the defect was remedied, tests revealed that the motor had been running with an earth in the shunt circuit which had seriously overheated one of the field coils, necessitating an immediate replacement. Normally, of course, this fault would have resulted in a blown fuse.—*A.J.D.*

Works Hand-lamps

IN a works where Home Office hand-lamps were in extensive use, trouble arose from departments taking hand-lamps from other sections when their own lamps had become faulty or had been misplaced. To minimise this trouble the hand-lamps were labelled. Copper strip ·5 in. by ·05 in., which was in stock for earthing purposes, was stamped with letter punches and screwed to the lamps with short wood-screws, care being taken that the screw points did not penetrate the wood and make contact with the brass lampholders. A blob of solder on each screw-head reduced the possibility of labels being removed. At positions in the works where hand-lamps were in everyday use, flat-iron hooks were fixed near the socket outlets so that the cable could be neatly hung in a large coil when not needed. Socket outlets were switched so that it became unnecessary to remove the plugs each time hand-lamps were not required. In places where the portable light was used from one socket only the plug-end of the cable was bound to the hook with adhesive tape, thus giving further protection against removal. Although this scheme could not give absolute freedom from interference, the improvement was such as to lead the management to have similar labels attached to departmental brooms, hand-brushes, oil cans and other loose tools.—*A.M.*

Contributions to this page dealing with specific items of interest to electrical engineers and maintenance men are welcome, and, if accepted, will be paid for at the standard rates. Problems of a practical nature to which a solution is required will also be considered. Contributions should be written on one side of the paper only and may be accompanied by sketches, which will be re-drawn for publication.

BEAMA ENTERTAINS

Sir George Nelson presides at the Association's first Annual Dinner for fourteen years

FROM its opening, with the procession to the speakers' table, to its close with a reunion after musical honours had been accorded to the president, Sir George Nelson, the revived B.E.A.M.A. dinner held last Thursday proved a successful and enjoyable function for the twelve hundred and more who attended.

After the loyal toasts had been honoured, the first speaker was MR. T. F. LISTER, chairman of the Beama Council, who proposed "Our Guests." He said that they had hoped to have the company of Mr. Duncan Sandys and of Lord Ismay, but this had not proved possible. Mr. Sandys, in a letter to Sir George Nelson, regretting his inability to attend said that he wished to take the opportunity of congratulating the electrical industry on its achievements in 1951. New generating plant delivered to the B.E.A. permitted record plant commissioning; foreign exchange earnings of the industry amounted to £180 m., and made it Britain's second largest exporting industry.

Mr. Lister went on to recall that the last Beama dinner had been held in 1938; it had been felt wrong to hold large functions in the intervening years. Since 1938, many new friendships had been built up, particularly with customers overseas, and improved speed of travel had been a great help in this respect.

Responding to the toast LORD RADCLIFFE OF WERNETH, P.C., G.B.E., a Lord of Appeal in Ordinary, spoke of Beama and similar organisations as up-to-date versions of the City Companies of the past, and undertook many of the functions that they once performed. He was glad to hear of the interest the Association took in education.

"The Electrical Industry" was a warmly received toast which PROFESSOR E. N. DA C. ANDRADE, F.R.S., (Director, Royal Institution) proposed. He referred to the comparative youth of the electrical industry, and to its complexity, and went on to define its scope as from physics to politics. Physics had always been the beginning, and politics the end: "sources of inspiration and impediment."

SIR GEORGE NELSON commenced his reply to the toast with a brief review of the progress made by the industry in the last 40 years. In 1912 the installed generating capacity of the country was only 733 MW. Now it was 15,000 MW. The manufacturing industry, he said, was giving every assistance to the supply industry to ensure that the fullest benefit was derived from such advantages as there are in nationalisation, to offset the disadvantages, which any State enterprise, however competently run, had to suffer.

The manufacturing industry needed, and received from the B.E.A., warm co-operation to obtain maximum exports through suitable standardisation and other means to cheapen production. In general, he had found affection and respect for Great Britain in his trips abroad, and especially so in his trip round the world last year. Those who represented the industry overseas were doing magnificently.

Turning to material problems, he said that it had been suggested that if all countries in the world developed in respect to their population at the same rate as the United States, the supply of many essential materials would be exhausted in less than one generation. This was a serious warning that if the standard of living of the world were to continue to rise, new sources of materials, such as aluminium from clay had to be developed. Energy sources to replace coal and oil were also necessary and hydro power, photo-synthesis, and nuclear power all had a part to play.

Dealing with materials available at present. Sir George spoke specially of the steel shortage, Although only 15% of the countries manufacturing capacity went to the defence programme, the allocation of materials to the other 85% had somehow fallen much below that level.

After Sir George had completed his speech, SIR HARRY RAILING rose to propose his health, a toast which the company enthusiastically received. Sir George replied with a short and witty epilogue to his earlier remarks.

1. This view of the speakers' table shows, from left to right, Lord Citrine, Sir Harry Railing, Lord De L'Isle and Dudley (Secretary of State for Air), the High Commissioner for Pakistan (Mr. Rahimtoola), Professor E. N. da C. Andrade, Sir George Nelson, Lord Radcliffe, the High Commissioner for Canada (Mr. W. Wilgress), Mr. Peter Thorneycroft (President of the Board of Trade) and the Portuguese Ambassador. 2. In this group, taken at the reception before the dinner, are seen Sir George Nelson, Mr. Wilgress, Mr. Rahimtoola and Lord Radcliffe, while (3) shows Sir Harry Railing addressing the gathering. Also taken at the reception, (4) shows Mr. Lister, right, chairman of B.E.A.M.A., in conversation with Mr. Wilgress. Finally, (5) Mr. Herbert Taylor's table is pictured in this final view

PLANT IN NIGERIA

Notes on its behaviour, transport and working conditions

(Continued from page 161 of our issue of 24th January.)

By J. MELLANBY, M.A., A.M.I.E.E., M.I.H.V.E., M.Inst.F.

WITH proper packing, actual breakages of machinery en route are uncommon. An example of what can be done was afforded by an armature weighing about one ton. Its case had an inner lining of roofing felt, and the whole was sealed with pitch, silica gel dryers being placed inside. After a lorry journey of 200 miles, this arrived in the state in which it left the manufacturer's works in Britain.

When goods are sent by air freight, some suppliers go to the wrong extreme and provide packing strong enough for a sea voyage. This is safe, but very costly. Experience has shown that when goods are properly packed in strong cardboard containers, there is seldom any damage. It is a good insurance when shipping switchboards to detach the instruments and send them by air, while the rest of the apparatus goes by sea. This effectively protects the most delicate parts from possible damage by water.

Manufacturers who have not previously exported to this part of the world are strongly advised to make use of an experienced shipping agent, and to make sure that if an Import Licence is required at the destination country, it is obtained. Ignorance of the "correct channels" may result in inconvenience and loss.

Cables

T.R.S. cables are at present used for about 95% of all installation work. They are generally satisfactory and the majority of local electricians make a neat, sound job of their installation. While good quality material has a long life, perishing of the rubber takes place rapidly on the cheaper makes, especially where there are sharp bends. V.I.R. cables have already been mentioned in connection with ants. They have been used successfully both for surface wiring and in aluminium alloy conduit. They are not satisfactory in steel conduit as rusting occurs, especially at bends, and the rust and moisture appear to destroy the insulation. Some old wood-casing jobs are still in use. P.V.C. cables probably have a great future. They are certainly effective when used in aluminium alloy or plastic conduit, and no doubt other applications will be found. They are apparently immune from attack by moulds and insects, and, owing to lower leakage at the ends, give in a conduit installation a much better insulation resistance than v.i.r. The greater range of colours makes wiring easier and avoids mistakes, and their smaller dimensions effects a considerable saving. P.I.L.C. cables are commonly used for terminating overhead lines, both h.t. and l.t. They give excellent service, and the lead boring beetle, which causes so much trouble in parts of India, does not appear to exist in West Africa. Some of the local thieves have, however, discovered how to strip the lead from a live cable and to escape before serious trouble is apparent.

P.I. aluminium cables would appear to have many advantages. Its lightness is very valuable in a country with transport difficulties. There is also no temptation for thieves to strip its sheathing for bullets.

The present copper shortage is forcing attention to be given to aluminium wire for overhead lines. For years there has been a prejudice against it, apparently without foundation, except possibly on the actual sea coast.

For special jobs, mineral-insulated copper-sheathed cable has been successfully used, though extra care is required when sealing the joints, and in at least one job mechanical fracture occurred where proper provision was not made for movement.

Cotton-braided flex gives little trouble, but silk is destroyed rapidly.

Wiring Accessories

Springs and other highly stressed metals, and particularly material subjected to vibration and alternating stresses, appear to fail much more rapidly in Nigeria than in Britain, while the difference in temperature, etc., does not appear to explain the change in performance. This is a subject on which research is long overdue. It is mentioned here for its bearing on the life of electrical accessories, especially switches, where it is found that the good ones last nearly as long as they do at home, while the inferior ones fail much more rapidly. Electrically, too, accessories are sub-

ject to more arduous conditions, and a combination of high humidity, condensation and Harmattan dust can initiate tracking on plastic insulation. Porcelain-based switches are, however, almost immune from this. Lightning surges, which have been mentioned previously, in addition to damaging appliances, can play havoc with switchplugs, especially inferior flimsy ones. While it has not been possible to compile any fully statistical results as to behaviour of plastics, owing to lack of knowledge of these and to facilities for analysis, as a general rule it was found that the good quality accessories maintained their shape, while the inferior ones distorted seriously. Although plastic-base switches have been found to be generally unsatisfactory, little trouble has been experienced with ceiling roses and junction boxes of this material.

It is the normal practice to mix up lighting and 5 ampere sockets indiscriminately on the same sub-circuits, wired with 1/·044 or 3/·029. Since 1,500 W kettles are on sale by all the stores, this can lead to appreciable overloading both of wiring and of accessories.

Switch and Fuse Gear

Power stations and transformers are generally small by British standards, while mains and feeders are long. There is little need, therefore, for high rupturing capacity fuses or other powerful protection. In fact, the use of cartridge fuses can be very troublesome and expensive owing to the number of replacements required due to surges, trees across lines, etc. A good quality re-wireable fuse, with a conveniently available stock of the right size of wire, is much better.

On account of the high earth resistance usually prevailing, already mentioned, there is probably an excellent field for earth leakage trips, but no information is available as to work done on this subject so far. Main gear in cast-iron cases is not seriously affected by rusting. The diecast alloy cases, when they were available, were very nice, but sheet steel cases must be given adequate protection, preferably by galvanising.

The standard supply in Nigeria is a.c., 230/400, 50 cycles. A certain amount of d.c. exists, mainly from isolated private plants. D.C. troubles will be dealt with first. Starters are probably responsible for most of these, especially when machines have to be started and stopped frequently, as in general the resistances do not seem to be large enough (in dimensions, not in ohms) to compensate for the high ambient temperature, to avoid serious overheating and burning out. Trouble with field coils is much more frequent than with armatures; investigation usually shows that the coil in question has not been properly impregnated. Often the outside is varnished while the interior is perfectly dry. Armature coils, being so much smaller in cross section, usually seem to soak up the varnish anyhow.

Dust Troubles

There should be no spaces in or around field windings where dust, etc., can collect. Accumulation of damp sawdust between the shunt and series turns of a motor in a sawmill caused a rapid breakdown in insulation. Had both coils been thoroughly impregnated, and taped up so that there was no space along the leads where dust could get in, this failure would not have taken place. Most trouble affecting armatures has usually been due to overloading or other misuse such as overheating, resulting from lack of attention to commutator and brushes.

Current regulations for a.c. motors require all machines over ½ h.p. to be 3-phase. Very little trouble occurs with the windings of squirrel-cage motors, most failures being due to carelessness or neglect, over or under lubrication or overloading. The only common source of trouble, for which the user cannot be blamed, is due to the fact that at the present time many supply systems are so overloaded that it is impossible to maintain the voltage and frequency at their correct value during peak periods. Since these peaks usually occur between 6 a.m. to 8 a.m. and from 6.30 p.m. to 8 p.m., the domestic refrigerator tends to suffer more than the industrial motor.

Starters give much more trouble than motors. One reason for this appears to be the small size of generators and transformers, leading to temporary reduction of voltage during starting and prolonged starting period. Even under bad conditions, little trouble is experienced with really robust starting equipment of adequate size and made by first-class manufacturers, providing a certain amount of routine maintenance is given. Simplicity should be aimed at, i.e., hand operated star-delta starters will give less trouble and require less maintenance than automatic.

On the smaller sizes of motor, which are usually single-phase, certain makes of repulsion-induction motor have been found to be troublesome because the centrifugal gear is much too flimsy. Capacitors are the weakest part of capacitor motors. It seems that there is a need for a "tropical" capacitor, larger in

dimensions and with a higher factor of safety than the normal one.

Domestic Appliances

Probably the most essential appliance in a tropical country is the refrigerator. In most households it accounts for two-thirds of the electricity consumption. There is much to recommend the absorption type, particularly at the present time. It requires much less maintenance than the compressor type, it can be converted to operate on kerosene when no electricity is available, it is not liable to burn out during periods of low voltage, and if replacements have to be made, a new heater only costs 5% of the cost of a new motor. When total operating costs of absorption and compressor types are compared, it is usually found that the latter's lower consumption, due to its higher coefficient of performance, is generally more than swamped by greater maintenance charges. However, as supplies at the maintained declared voltage become more widespread, competition may be expected to increase from the sealed-unit type, which is also practically silent.

Small motor-driven appliances are usually satisfactory if not used too much, so as to avoid overheating.

There should be a lot to recommend the kettle fitted with a safety device to avoid damage if left to boil dry. Unfortunately, the safety device does not always work. Since the usual temperature of tap water is about 80° F., water heaters can have lower loadings than is customary in colder countries. They are usually very reliable.

Generating Plant

Even though proposals have been made for the construction of a Grid system in Nigeria, it is obvious that for many years to come there will be a large demand for small and medium generating sets for isolated housing, schools, hospitals, etc. The demand appears to be mainly for diesel-driven alternators, generating standard voltage and frequency, between 2 kW and 50 kW. Their high cost and likely higher depreciation, apart from introducing a non-standard supply, limits the demand for d.c. battery sets. It is usually cheaper and more satisfactory to install a duplicate plant where 100% reliability is essential. The following remarks therefore refer to sets of this type.

Most plants now being shipped, in order to satisfy the demands for low price and light weight, are much too high speed. For reliability, experience over many different makes indicates that plants under 25 kW should not exceed 1,000 r.p.m., with even slower speeds for larger outputs. Except in the very smallest sizes, engines should have a large enough number of cylinders to reduce the cyclic variation to a reasonable value and to allow of parallel operation. Normally, direct-coupled sets can be recommended, though it has been found that larger and heavier flexible couplings are required in Nigeria than in Britain. This is largely attributable to the great diurnal change of humidity during the Harmattan season.

Flexible Couplings

A very great deal of trouble has been had with flexible couplings with plants running for long periods at or about full load, and some manufacturers took a lot of convincing that this was not due to improper alignment. However, knowing that the alignment was well within the allowable limits, it was found that one type of coupling gave an average life of under three weeks during the Harmattan and four months during the wet season, when temperature and humidity is much more uniform. Fixing two similar discs in parallel greatly improved matters. A different type of disc was then tried, in which the fabric was completely sealed by an impervious rubber compound. Results appear promising so far. Equally improved results were also obtained with much larger sizes of ordinary disc. For example, a disc which only gave a short life on a 27 kVA plant was satisfactory on one of 20 kVA at the same speed. In general, the use of Vee rope drive, although reducing the first cost of a plant by using a smaller and faster generator, results in an appreciable addition to the running cost.

Many sets are supplied with the fuel tanks and switchboards mounted on the plant. Except when inevitable for portable equipment, this is a most undesirable arrangement. Experience shows that vibration, more serious in this climate than in a cooler country, will cause leakages in the tanks and connections, and serious damage to the switchboard instruments. When plants are supplied with the tank and switchboard all mounted together, users are strongly advised to separate them, and arrange for independent fixing.

The unusual climatic conditions prevailing during the Harmattan have already been mentioned. It is absolutely essential that machinery intended to operate under these conditions be provided with efficient filters for air, fuel and lubricating oil. Viscous type air filters have

proved very satisfactory—during the Harmattan they have to be cleaned daily, and once a week or fortnight at other times. Twin fuel filters are a great advantage.

In spite of every precaution to obtain clean fuel, choking of injectors will take place sooner or later, and usually at an inconvenient time. It is strongly recommended that a spare set of injectors for each engine be kept ready for these emergencies. The choked ones can then be cleaned at leisure. Fuel injection pumps have proved most reliable; with eight pumps in use, over a period of three years the only trouble was a broken spring. Injectors can be tested after cleaning by connecting to the pump and watching the spray when the engine is turned. However, in any installation with more than about eight cylinders, a hand pump and pressure gauge for nozzle testing is a very useful fitting to have. It should not normally be necessary to install more equipment than this.

Probably, however, the most important point in the choice of a generating plant is not so much the particular make (though I would not go so far as to say that they were like beer, and that there were no bad ones), the switchboard details or the method of installation, but simply, "Is it big enough for the job?" More good engines have been wrecked through overloading than from any other cause.

The modern self-regulating alternator appears to have much to recommend it, especially as price appears to be dropping. The minimum instruments recommended are one voltmeter, frequency meter and an ammeter on each phase. A tachometer may be used in place of the frequency meter.

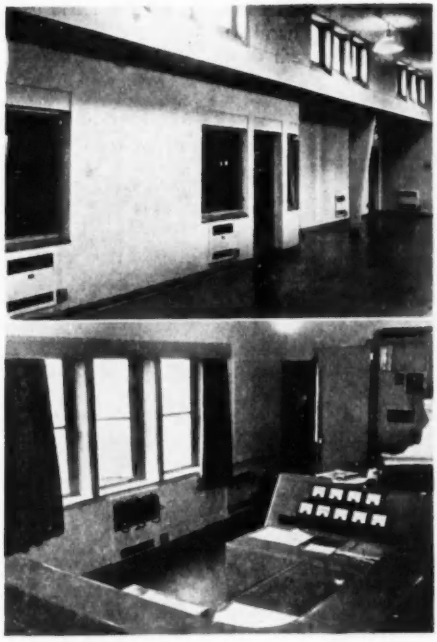
In these days of shortages and prolonged delivery periods, there is a possibility of doing business in reconditioned plant. Merchants and others should, however, before accepting this business, assure themselves that they know where the plant is going and that it is in condition to stand up to these conditions. Unscrupulous persons have been known to ship equipment out whose only "reconditioning" consisted of a badly applied coat of paint, the interior being literally tied together with string. This was an extreme case, but it gives the reputable firms handling this class of business a bad name. Whenever it can be arranged, a personal inspection by a competent person would appear to be a most valuable insurance to protect both parties. (*Concluded*).

Heating Holme Moss

FOLLOWING the success of Thermovent heating at the Sutton Coldfield transmitting station, the B.B.C. engineering staff, in conjunction with the Thermovent advisory service, based the entire heating of the Holme Moss station on the Thermovent system.

The installation is particularly interesting owing to the extremely exposed site high up on the Yorkshire moors and also for the unique use of heat dissipation from the transmitting valves as a means of supplementary heating. Two types of heaters are used: B type, 2 kW inset units, of which there are 34 fitted with special all-metal front panels, and a modified version of the MR type—a wall mounting heater usually specified for marine heating, the installation includes 22 of these. All heaters have built-in thermostatic control and the total loading is approximately 120 kW.

A temperature of 65° F is maintained in the transmitter hall as well as in the offices and other principal rooms with 60° F in corridors and workshops.



Type "B" inset Thermovent heaters installed in the transmitter hall (top). In the lower picture the Type "B" Thermovent heater is unusual. It is filled with a dual outlet which distributes warm air from the valve-cooling equipment

Progress in Production during 1951

BRITISH THOMSON-HOUSTON Co. Ltd.

THE B.T.H. factories are operating to capacity within the limits imposed by restricted raw materials and availability of labour. Certain extensions, together with the development of new methods and techniques—a continuous process—have increased the company's manufacturing potential.

Highlights of the year's production include the commissioning of the world's largest dragline, built by Ransomes and Rapier, Ltd., for Stewarts and Lloyds, Ltd. All the electrical equipment, including a full Ward-Leonard control scheme requiring some 3,000 h.p., was manufactured by B.T.H.

In the mining field much important work has been done, and orders of all kinds of electrical plant for the new N.C.B. collieries have been received, as well as orders for equipment for the modernisation and mechanisation of old pits. Work is also proceeding on winders for South Africa and Australia, and for the tin mines of Malaya. One winder, the largest and most modern type in the Cornish metalliferous mines, has been ordered.

Traction work has been marked by further significant advances in the diesel-electric field with work in hand for large and small locomotives for such diverse places as Australia, New Zealand, and Bolivia. Orders for the well-known P.C.M. camshaft control equipment for London Transport, and for the Bombay, Baroda and Central India Railway have been completed, and trolleybus electrical equipment is destined for Finland and Penang as well as for this country.

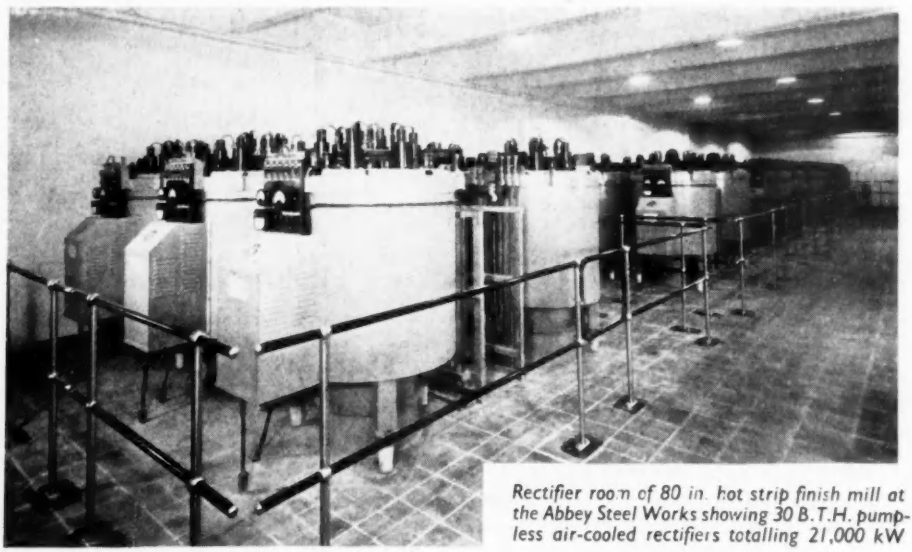
Turbo-Alternators

Turning now to the home power supply field, early in the year the B.E.A. ordered the second and third 60 MW turbo-alternators for Meaford "B" power station. Steam conditions here are 1,500 lb/sq in. at 1,050° F, and the alternators will be hydrogen cooled.

Recently completed is the first 75 MW set for Barking; the third 60 MW set for Staythorpe; the second 30 MW machine for Wigan; the first 60 MW set for Bankside; and a 30 MW set for Portsmouth—the fourth B.T.H. turbo-alternator in this station.

The 25 MW double-extraction, hydrogen-cooled turbo-alternator for the Ford Motor Company of Canada is nearing completion in the works.

Export orders include one for two 30 MW sets for Wallerawang, Australia. These are single-cylinder machines. Two similar turbines



Rectifier room of 80 in. hot strip finish mill at the Abbey Steel Works showing 30 B.T.H. pumpless air-cooled rectifiers totalling 21,000 kW

are being built under licence in Holland for installation in that country. One of these, an extraction turbine designed for 36 MW m.c.r. when not extracting is believed to be one of the largest units of its type designed by any British company up to the present.

Hydro Plant

Two of the three 62,400 kVA vertical waterwheel alternators for the Los Peares power station of Fuerzas Electricas del Noroeste, S.A., Spain, have been completed and tested, while construction of the third is well advanced. Four 16,700 kVA waterwheel alternators are in course of manufacture for the Owen Falls station of the Uganda Electricity Board, and, during the year, instructions were received to put in hand the manufacture of two similar machines. Ultimately there will be ten generating sets in this important station.

Another impressive order received by B.T.H. during 1951 is for two vertical waterwheel alternators, each rated at 66·66 MW, for Eildon power station in Australia. It is believed that the Boving (Francis Type) turbines will have the greatest output (82,000 h.p.) and the alternators the largest diameter (40 ft) of any machines yet ordered in Britain.

Transformers

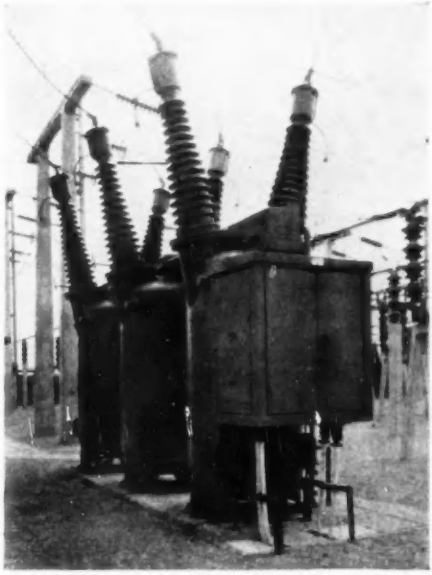
Many transformers have been completed during the year such as the No. 3 generator transformer for Staythorpe; this is rated at 75 MVA, 14/132 kV, and has on-load tap-changing gear. Other large B.E.A. transformers include the two 60 MVA 132/66/11 kV three-phase units for Islington substation.

For overseas markets, six 15 MVA 132/88 kV single-phase units for Colenso and Pietermaritzburg substations, a 40 MVA bank of single-phase 88/20 kV transformers for Orlando (Johannesburg), and three 15 MVA 33/12 kV units for Cape Town were completed. Also completed were six further 15 MVA 210 kV single-phase units for the State Electricity Commission of Victoria.

In connection with the 275 kV transmission line between Staythorpe and West Melton, B.T.H. has received orders for an additional transformer at Staythorpe and two transformers for West Melton, all rated at 120 MVA 275/132 kV.

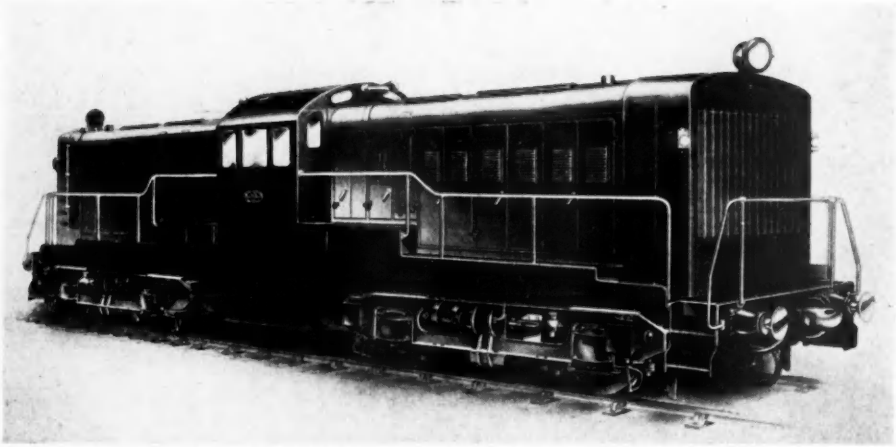
Switchgear

The lenticular oil circuit-breaker of the "Shuntarc" type, for operation at 275 kV, which was shown at the South Bank Exhibition, has been selected as one of those to be installed



132 kV type OW 409WN circuit-breakers for Bonnybridge, Scotland

One of three 62·4 kVA waterwheel alternators for Los Peares hydro-electric power station of Fuerzas Electricas del Noroeste, Spain



An artist's impression of one of the 1,000h.p. diesel electric locomotives with B.T.H. electrical equipment for New South Wales Government Railways

on the B.E.A. 275 kV system; and thirteen, each rated at 5,000 MVA 220 kV, have been ordered by the State Electricity Commission of Victoria, Australia.

Eleven 132 kV 3,500 MVA "Shuntarc" oil circuit-breakers are on order for South Africa, and for the B.E.A. there are equipments for a seven-switch 132 kV 2,500 MVA substation at Currie, and 132 kV 3,500 and 2,500 MVA extensions at West Melton, Skelton Grange, and Bonnybridge.

Large numbers of "dead tank" oil circuit-breakers, with the three phase in one tank, have been supplied for home and overseas, and 132 kV 2,500 MVA air-blast circuit-breakers at Brunswick Wharf generating station are to be commissioned shortly.

An important contract for the Railway Executive, Southern Region, covers approximately 100—33 kV 750 MVA single-phase, horizontal-drawout metalclad units for installation in 20 substations.

D.C. switchboards rated 40,000 amps at 250 V have been manufactured for I.C.I., and a further order has been received for two 50,000 amp units of similar design.

Rectifiers

A 21,000 kW bank of B.T.H. pumpless rectifiers has gone into commission at the Abbey Works of the Steel Co. of Wales. Another installation rated at 15,000 amperes at 600 V is nearing completion.

Traction accounts for 15—4,000 kW 1,500 V cubicle type rectifier units ordered by the Department of Railways, N.S.W., for the Sydney-Lithgow section. The system is designed to handle very heavy goods trains under regenerative braking control. London Transport has ordered four 1,200 kW 630 V pumpless cubicle type rectifier units.

Lighting

During the first few months of the year the installation of fluorescent lighting the Eregli Coal Mines, Turkey, was completed. About 3,500 flameproof fluorescent fittings with 40 W 4 ft lamps provide a high level of illumination throughout the underground working areas of these vast coalfields.

Also during the year the world's largest installation of fluorescent street lighting was completed in Rio de Janeiro. This scheme employs nearly 700 B.T.H. lanterns each housing three 80 W 5 ft Mazda fluorescent lamps. Other street lighting schemes employing fluorescent lighting were carried out at Oxford and Singapore.

In the industrial field, noteworthy installations were completed at Margam (Steel Co. of Wales) and the Rogerstone works of the Northern Aluminium Co.

Lighting played a large part in the creation of last year's Festival attractions and here, too, Mazda lamps and fittings were well in evidence. Apart from the outstanding illuminations at the South Bank where B.T.H. supplied floodlights and other equipment for about a quarter of the site, the company was responsible for one of the most spectacular displays—the floodlighting of Windsor Castle. Cliff Quay generating station at Ipswich was also illuminated for Festival Week and proved a great attraction.

Dust Deposition

MODERN METHODS OF PREVENTION

THE question of dust carry-over from power station chimneys is one which has always exercised electricity undertakings. Nothing is more likely to cause local opposition and complaint, although it has been known of complaints to be received about plant which at the time had not yet been commissioned. A general survey of this vital subject was given by Mr. G. C. Goodwin to the Manchester Association of Engineers last Friday.

Early Work

Although the problem was one that went back a good many years, it was only during the last 15 or 20 years that it had been seriously tackled and progress made. In the early days of dust collection a careful distinction was made between what was called "grit" and the finer particles which were classed as "dust and fume." The early equipment was designed only to entrap the coarsest or "grit" particles, while the modern tendency was to class all solid particles in the waste gases as dust and to extract the maximum amount of this which could be done economically.

In estimating particle size the first method was by sieving the dust through a range of sieves. This was simple, but had several disadvantages as it was difficult to establish a standard procedure, the finest sieve was not sufficiently fine for modern grading and no account could be taken of the shape of the particle other than the dimension across one cross section. Microscopic examination enabled finer grading to be carried out, but it was difficult to ensure that the sample was representative, and there was no logical way of converting the result into a percentage by weight. Another method was by comparing falling velocities, but modern techniques utilised sedimentation or elutriation methods.

Dust Collection

Dust collection was usually carried out in one or more of three main ways: by water washing; by centrifugal collectors; and by electrostatic precipitation. The first method was not generally used in these days although it was important where it was required to eliminate oxides of sulphur. Centrifugal collectors all operated on the same general principles. The dust-laden gases were given a whirling motion, either by tangential entry into a more or less cylindrical vessel, or by vanes, when the centrifugal force diverted the dust particles to the outside of the vessel where they were removed. It was possible to obtain the same effect by introducing a sudden change of direction in the gas flow, and some forms of collector used this.

Electrostatic precipitators operated by charging the dust particles electrostatically and then attracting them to collectors.

The user of a dust collection plant was chiefly concerned with the amount of dust which was being discharged from his chimney, but the maker of the equipment was mainly interested in the amount and grading of the dust with which the collector had to deal. This last information was particularly difficult to obtain as development in design of various forms of boiler firing proceeded so rapidly. In the meanwhile the maker of dust collecting plant was faced with the necessity of stating an overall efficiency without his having been given the necessary data for calculating it.

Testing

Testing could be carried out either in the laboratory or on site. In the former case the quantities measured were the quantity of gas handled by the collector; the quantity of dust fed into the collector, and the quantity of dust caught by the collector.

Site tests were more expensive as conditions were not under such good control as in the laboratory. Obtaining the dust burden involved the collection of a "representative sample." This was extremely difficult as most boilers were not built for the collecting of samples, and changes in cross section, varying velocity and changes of gas direction frequently occurred, altering the proportion of dust, and the relative quantities of different sizes.

The author concluded by stating that the cost of dust elimination rose steeply as the efficiency of collection was increased, and he suggested that a central or national body should be given powers to specify the degree of elimination necessary, the grading of dust allowed to escape, and methods of demonstrating that the desired conditions had been achieved. If this were then applied to all chimneys and industrial processes, one particular section of the community would not be unfairly burdened by restrictions.

UNTAPPED MARKETS

Guide to U.S. Public Authority Buying

PUBLIC authorities in the U.S.A. spent, in 1950, some 15 thousand million dollars at Federal, State and Municipal level. It is with this thought that Mr. Peter Thorneycroft, President of the Board of Trade, introduces a new Stationery Office publication designed to help British exporters in breaking into this market. The main obstacle to be overcome is the "Buy American" Act of 1933, which lays down the terms and conditions under which public authorities in the U.S.A. can purchase from foreign sources. In this new survey, the difficulties which this legislation presents are suggested to be less serious than is usually imagined.

One of the first tasks attempted in this market survey is an estimate of the money spent on items of particular interest to British manufacturers; electrical machinery, equipment and instruments figure quite largely here.

Legal Obstacles

At federal level the "Buy American" Act, already mentioned, operates to provide that, subject to certain exceptions, only goods of domestic origin can be bought by federal purchasing agencies. The exceptions allow foreign goods to be bought if they are to be used outside the U.S.A., if domestic equivalents are "not reasonably available in commercial quantities," if the cost of domestic goods is "unreasonable," or if the purchase of domestic goods would be "inconsistent with the public interest." Unreasonable cost has been defined as 25% dearer than foreign equivalents, excluding the effect of duty payable on the latter. There are, of course, many qualifications of these rulings, and these are examined in the survey.

In regard to state purchases, although there are many variations, in general the foreign seller who wishes to obtain state contracts is under no worse handicap than a United States supplier who is not a taxpayer in the state concerned. Eleven states have no written discrimination against an out-of-state seller; four states—California, Massachusetts, New Jersey, and Pennsylvania—specifically discriminate against foreign suppliers.

The question arises, whether the laws mentioned above can be taken as fairly representative of responsible American opinion. It is suggested in the survey that there has been a swing from protectionism, and both public statements and private conferences with government purchasing officials are quoted to support this view. The conclusion reached, is that an intensified British sales effort directed towards public agencies would not meet with hostility or wide and active resistance; indeed, helpful cooperation could be expected.

It has to be realised, however, that the existence of discriminating legislation tends to prevent officials going out of their way to invite foreign bids for contracts. Moreover, American companies bidding for a contract may use the existence of such laws as a lever to persuade the purchasing authority to abstain from active searching outside U.S. sources. What is required, is an intensified and hard-hitting British sales programme. This would put friendly Americans in the best position to be helpful; it would help bring practical details such as price and quality into question, rather than abstract principles such as "protectionism," and it is an effective step which can be taken immediately.

Procedure

As an example of the purchasing procedure common in the U.S., that of the Department for the Army is selected for description in some detail. Each purchasing officer involved keeps his own lists of the items he purchases and of prospective bidders. Therefore, in order to bid, the salesman must keep in touch with the purchasing agent to which he wishes to sell. Information that will be early required by the purchaser includes a catalogue, details of plant capacity and commercial standing, and data on previous government contracts held.

Contracts are placed through advertising and competitive bidding or, exceptionally, by negotiation. Where the bidding procedure is followed, all prospective suppliers on the purchasing officer's list receive specifications and invitations to bid. Some positive response to such an invitation (even if it is an indication that the manufacturer does not wish to bid) is necessary if a firm is to remain on the list. At the stated time, bids are publicly opened, and a formal award of the contract is usually made.

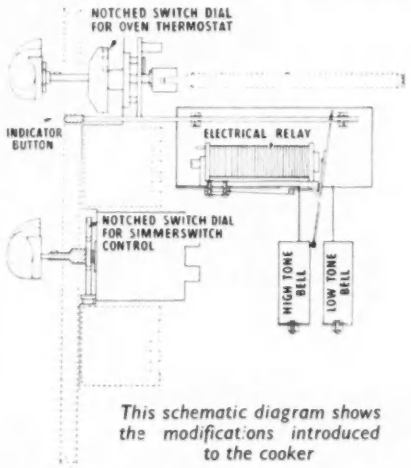
Differences in the procedure adopted by other government agencies, and by state and city purchasing departments are set out at some length in the rest of the survey.

COOKERS FOR THE BLIND

Development to Assist the Sightless Housewife

INVENTED by Mr. G. W. D. Currey, a G.E.C. service engineer, is a small and simple mechanism to enable a standard cooker to be adapted for use by sightless people.

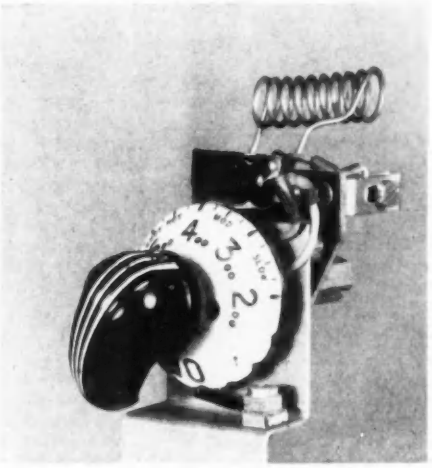
The device consists of two units each complementary to the other; one indicates, by means of a trip mechanism, various temperature settings on the "Simmerswitch" and thermostat controls, the other is an electrical relay in series with the thermostat which, when energised, pushes out an indicator button through the switch panel on the cooker front, and at the same time rings a low tone bell to indicate that the cooker is switched "on." When the temperature as set on the thermostat is reached, a high tone bell rings and the button recedes into the cooker. The blind person has then merely to set her braille process timer before placing her cake, or whatever else she may be



This schematic diagram shows the modifications introduced to the cooker

cooking, in the oven. Thus, two means of checking the oven temperature are given so that the blind housewife can carry on with her duties in another part of the kitchen or house without continually leaving her work to touch the button on the front of the cooker.

The General Electric Company Ltd., has decided to supply this control unit without charge for use on any new cookers supplied to the blind. The first person to have the invention is Mrs. D. K. Eady of Romford, who has a husband and small boy to look after. She says cheerfully: "I won first prize with my 'queen' cakes at a competition by Essex County Council!"



The modified thermostat dial is shown here

It was a happy coincidence that this invention was made available for the first time during the week which commemorates the centenary of Louis Braille.

CODE OF PRACTICE

Electric Lifts for Passengers, Goods and Service.—*C.P. 407.101. Price 4s.*—The Council for Codes of Practice for Buildings has now issued, in final form, this document which has been drawn up by a committee convened by the Institution of Mechanical Engineers on behalf of the Council and is a revision, following comments received, of the draft Code previously issued.

The Code deals with the installation in flats, shops and department stores, hospitals, and industrial premises of lifts operated by electric power for passengers, goods and service. It indicates the information which should be exchanged between interested parties and the sequence of events from the inquiry stage to the handing over of the installation. General guidance is given on the conditions which govern the choice of equipment, the location of lifts and machine room, and the service requirements from, and co-operation with, other trades. Structural requirements are also dealt with.

overseas news

Snowy Schemes

The Australian Government is shortly to call tenders abroad for two Snowy Mountains projects, the Minister for National Development, Mr. Spooner, has announced. The projects are: an 18-mile tunnel from the Adaminaby storage dam to the Tumut Pond reservoir; and the first power house of 200,000 kW peak load below Tumut Pond. He said it was hoped that this station would be generating by 1956. It would be one of seven between Tumut and Adaminaby which would generate a total of 1,180 MW. From another part of the project 60,000 kW should be available at the Guthega power station before the end of 1954.

Kiewa Tunnel Through

Tunnellers have this month holed through their second tunnel—for the tail-race of Kiewa No. 4 power station. The tunnel is 6,600 ft long, about 16 ft wide and 20 ft high. It was started 4½ years ago. The tunnel passes twice under the bed of the West Kiewa River. It will carry away water from a power station the State Electricity Commission is building 450 ft underground. On the opposite side of the power station is the head-race tunnel in which the gangs holed through last November. It is expected that the power station will be in operation next year, and will generate 190 million units annually.

Funds Short in Queensland

Loan fund priority has been made available to the Regional Electricity Boards for the construction of new power stations at Townsville, Rockhampton and Mackay, the Queensland State Electricity Commissioner, Mr. Neil Smith, stated earlier this month. He had discussed the funds shortage with representatives of the Boards, and it was evident that it would mean the curtailment of many development projects. The four Regional Electricity Boards are to receive a total of £516,500 in loans, it is revealed. The boards to benefit are: Wide Bay-Burnett, £178,500; Capricornia, £142,000; Townsville, £183,500; Cairns, £12,500. A State Electricity Commission officer has said that the Capricornia and Townsville board loans would be for generating works in commissioning new power stations. The Wide Bay-Burnett Board's loan would be for generating equipment, and the Cairns Board would use its funds for development work.

Fish v. Power

The question of fish *v.* power is one that is beginning to engage official and private interests in British Columbia. It is one which did not arise until the phenomenal industrial development boom made it necessary to develop power resources which hitherto merely served to make provincial parks and other beauty spots. There is, for instance, the development of the Fraser River at Quesnel. Here, the salmon run seems likely to be affected; but this difficulty should not be beyond solution. A greater problem appears to have arisen, however, in connection with the Buttle Lake power development on Vancouver Island, where the British Columbia Power Commission have a scheme in mind. But here there has been opposition from the Lands and Forest Branch, which has argued against the project in the current series of hearings.

Winnipeg's Recommendation

It has now virtually been decided that the question of the future power status of Winnipeg city shall be submitted to a referendum of ratepayers. This was agreed upon at an informal city council meeting earlier this month. It is stated that the Council also overwhelmingly endorsed Plan "C", but rejected a proposal for its implementation without a referendum. A proviso was added that the final costs should approximate the values placed on units of both utilities by the board and the city's auditors. Plan C, if put in force, would place the power plants and primary transmission lines of both the city hydro and the Winnipeg Electric Co. in the hands of the Manitoba Government. An inter-municipal commission would operate the metropolitan assets of both utilities, including the public transit system.

H.P. Business Slack

Small modifications to the present credit restrictions, announced by Finance Minister Abbott this month, have not raised any enthusiasm in Canadian trade circles, according to reports. The modification extends the time over which payment may be made, but the trade considers that it is the large initial payment which is hindering business. Mr. W. N. Simpson, manager of the Canadian Electrical Manufacturers' Association, considers that the latest announcement has effectively killed sales for the next two months. "It may have a psychological effect, but the practical result won't be nearly enough to keep the electrical appliance business out of the red," Mr. Simpson pointed out. "Employment in the industry is down to 50%, production is below 40%, and sales at the retail level are only 25% of last year's figures," he added.

Surveys

Canadian Federal Government engineers are continuing work to find a suitable site for a dam on the Columbia River five miles from Castlegar, near the southern end of the Arrow Lakes. A

similar survey farther up the Columbia on the Big Bend Highway discovered good foundation material 80 miles north of Revelstoke. The work is part of a programme to find and develop the power potential of the Columbia River, which is developed to a far greater extent in Washington State, now running short of power.

New Line

The Corporation of the City of Nelson, British Columbia, has been authorised by order-in-council to raise the sum of $300,000 for the purpost of constructing a new power transmission line and other works necessary for the expansion of its service.

Magnetic Research

Development of a new material for permanent magnets has been reported at a meeting of the Netherlands Physical Society. Called Ferroxdure, it was developed by the Philips research laboratories at Eindhoven. The product is a ceramic and in structure and composition differs greatly from the traditional magnet steels, it was stated. Its properties were said to offer many new possibilities for the application of permanent magnet materials. Cobalt and nickel are not required in the manufacture of Ferroxdure which is produced by sintering or firing, like chinaware. It is described as an oxide, and contains iron and barium. The new magnet is claimed to be particularly suitable for use in dynamos, motors and some special kinds of transformers; it is also expected to be of interest to manufacturers of telephone, radar and television equipment.

Plant for Turkey

The Turkish Iller Bank recently called for tenders for the provision of electric generating sets at Sarikamis and Milas and indicated their intention to call for similar tenders for other municipalities in Turkey. The specifications stipulated a type of diesel generating plant which could be provided by only a limited number of European firms. The British Embassy has registered a protest against this discrimination and the Ministry of Public Works has promised that the specifications will be amended, we understand.

Railway's Power Station

A new power station specifically for railway electrification operation is now under construction at Braz, near Bludenz, for Austrian Railways. This station will assure power requirements for the electrified lines, especially after the completion of the electrification works on the western line connecting with Vienna. The power station, situated at a lower level than the Spullersee in the Vorarlberg, will utilise the same waters of this basin, in addition to the water deviated from the Alfenz stream, originating in the Vorarlberg and flowing into the Klosteltal. This will be the first excavation-built plant in Austria, it is understood, this construction being made necessary by the extreme narrowness of the valley, which prevents a common type installation. The power station will be provided with three turbines each of 11,000 h.p. which are being made in Austria. It is expected that the station will be ready for operation this autumn, as planned.

Mid-Atlantic Power

The Portuguese Minister for Public Works has approved plans for a hydro-electric scheme for the Island of Terceira in the Azores. The maximum cost of the scheme is to be 20,000 contos, of which 5,000 will be provided by the Government from the Unemployment Fund and 15,000 by a loan from the Caixa Geral dos Depositos to the local administration of Angra do Heroismo. No public invitation to tender for the supply of the equipment needed has yet been made.

Wind Power

A strong plea for the adoption of wind generating power plants, particularly in rural areas, was made earlier this month by Prof. J. N. Basu, when presiding over the Engineering Section at the 39th session of the Indian Science Congress Association, in Calcutta. In referring to the extreme maldistribution of power in the country, he pointed out that out of 559,000 villages, only 2,168 villages as yet had an electricity supply. And while the usual methods of electrification, i.e. by (1) pilot plant or (2) supplying power from industrial plants or (3) by tapping from the grid system, should be extended as extensively as possible, the speaker suggested the harnessing of wind power. Turning to power consumption in India, Prof. Basu said "installed capacity in that country in 1949 was 2·08 million kW including the kW capacity of the industries. The per capita consumption rose from 14.1 in 1947 to 18.7 in 1950. This was still very low in comparison to Canada (3,580), U.S. (2,290), U.K. (855) and Japan (390).

Japan's Outlook

In recent months the power situation in various parts of Japan has become critical, as we have already reported, and although all parties are agreed that a rapid development of power resources is needed, the manner in which this should be carried out has yet to be decided upon. One party has suggested the formation of a national power development corporation financed by the Government; another has proposed a state-controlled project depending upon Government funds and investments by the people, while yet a third is stated to have in mind a plan patterned after the Tennessee Valley Authority. The Public Utilities Commission has plans for yet another proposal—the formation of a Power Resources Development Bank, which would be authorised to develop power resources. But whatever the method adopted, there seems to be a welcome realisation that Japan cannot seek foreign capital but must utilise its own wealth.

PERSONALITIES

IN THE INDUSTRY

Promoted to the post of engineer-in-chief to the South Eastern Electricity Board is **Mr. W. E. Gibbs,** M.I.E.E., who was formerly deputy engineer-in-chief. He succeeds **Mr. W. A. Gallon,** who has been appointed controller of the Merseyside and N. Wales Division of the B.E.A., as we have already recorded. Born in Maidstone in 1900, Mr. Gibbs gained early technical training at Battersea Polytechnic and joined the former County of London Electric Supply Co. as a student in 1918. He subsequently became an assistant engineer in the mains department covering the London, Surrey, Essex areas, and served successively as technical assistant, transmission superintendent, supervisory control engineer and assistant superintendent electrical engineer in various areas controlled by the County of London group. In October, 1945, he was appointed regional manager for the South West region of the group, the area covering a large part of south-east London and parts of east Surrey. He became deputy engineer-in-chief to the Board on vesting day.

Mr. W. E. Gibbs

Sir Andrew McCance, F.R.S., has accepted the invitation of the Lord President of the Council to be chairman of the Mechanical Engineering Research Board of the Department of Scientific and Industrial Research in succession to the retiring chairman, **Sir Henry Guy,** F.R.S. He will assume office next month.

The new branch manager of the Edinburgh sales office of British Insulated Callender's Cables Ltd., is **Mr. I. O. Stewart,** who succeeds the late Mr. J. H. Dinwoodie. Educated at the Melrose and Edinburgh Academy and the Heriot-Watt College, Mr. Stewart joined the former British Insulated Cables Ltd., at Glasgow in 1934. He was appointed to the Edinburgh branch in 1936 and thus, throughout his long service, broken only by a wartime appointment as works engineer at the Ministry of Aircraft Production factory at Corstorphine, he has been with B.I.C.C. Scottish sales offices exclusively.

Mr. I. O. Stewart

Chosen as deputy chairman of the Yorkshire Electricity Board is **Mr. Arthur Bond,** who since 1948, has been secretary and solicitor to the Eastern Electricity Board. Mr. Bond, who takes up duties as from February 1, replaces Mr. Frederick Newey, M.I.E.E., who has resigned, as we have already noted. A native of Darwen, Lancs, after being articled with solicitors in private practice, Mr. Bond entered local government service. Subsequent to holding appointments at Cleethorpes, Macclesfield and Luton, he was appointed town clerk of Macclesfield in 1938, and town clerk of Stockport in 1944, holding that post till joining the Eastern Board in 1948.

One of the leading authorities on world submarine telegraph and telephone cables, **Dr. Esmond Wassell Smith,** PH.D., B.SC., M.I.E.E., has been appointed to the Boards of the Telegraph Construction and Maintenance Co. Ltd., and its subsidiary, the Selborne Plantation Co. Ltd., to fill the vacancies caused by the retirement of **Lord Riverdale.** A director of Submarine Cables Ltd., an associated company, Dr. Smith was formerly chief electrician and, latterly, manager responsible for submarine cable production at Telcon works. He joined the company in 1910 at the age of 16, and served from 1916-18 in India and with the Aden Field Force. In 1926 he accompanied the expedition to lay the Cocos-Perth loaded telegraph cable, primarily for the purpose of conducting research on the cable after it was laid. Similar work in connection with the Pacific loaded cable took him later in that same year to Vancouver. He was also with the expedition to Newfoundland which laid the first duplex loaded cable in 1928. It was this research which provided him with the material for the thesis which gained for him the degree of Ph.D. of the University of London. He subsequently went to Teneriffe in 1929, in conjunction with research on coaxial telephone cables, presenting a paper on this subject to the I.E.E. on his return.

Dr. E. W. Smith

Technical service manager of Hoover Ltd., **Mr. J. B. Rogerson** has just completed 25 years service with the company and has been presented by them with a gold watch in token of that achievement. He started with the service side of the company in 1927, was later promoted to service supervisor at Leeds, and then regional service

manager for the whole north-eastern region. After war service, he became assistant technical service manager in 1945, and was promoted to his present post last year.

Following upon the death of Mr. W. G. Swain, managing director of Crypto, Ltd., the directors of the parent company (Lancashire Dynamo Holdings, Ltd.) have, pending the return of their chairman, Mr. H. W. Bosworth, from his Australian business tour, appointed two of their number: **Mr. D. C. Lorkin** and **Mr. S. G. Mundy,** to act as joint managing directors of Crypto Ltd. The position of Mr. Lorkin as joint managing director of Lancashire Dynamo and Crypto (Mfg.) Ltd., and of Mr. Mundy as managing director of Crypton Equipment Ltd., will not be affected by this arrangement.

Mr. Gordon R. Ball has been appointed to the Board of the International Nickel Company of Canada Ltd.

Chosen as station superintendent at the shortly to be completed Uskmouth generating station, South Wales Division of the B.E.A., is **Mr. W. Lloyd Williams,** A.M.I.E.E., A.M.INST.F., who, since 1948, has been deputy station superintendent at Upper Boat power station in the same Division. Educated at Hatherleigh Secondary School and Newport Technical College, Mr. Williams started with the Newport Corporation Electricity Department as an articled student engineer, and was subsequently engaged as a technical assistant in the substation department and a junior charge engineer at East power station, Newport. He joined the Yorkshire Electric Power Co. in 1938 as assistant shift charge engineer at Ferrybridge power station, but returned to South Wales in 1942 as shift charge engineer at Roath power station, Cardiff. There he was deputy station superintendent from 1946 till 1948, when he took up his present post at Upper Boat. Mr. Williams will probably take up his new duties in March, we understand.

Mr. W. Lloyd Williams

An award of the C.B.E. in the recent New Year Honours List to **Mr. Milton Victor Ely,** member of the Board of Governors, King's College Hospital, rather shrouds the identity of one who must be known to many in the electrical industry. For Mr. Ely founded in 1903 the Foster Arc Lamp Co.—the forerunner of Foster Transformers and Switchgear Ltd. and Foster Electrical Supplies Ltd., of which companies he is now chairman. He is also a director of Lancashire Dynamo Holdings Ltd. Mr. Ely's award is evidently in recognition of public services, for his main outside interest for many years has been hospital work—he has been a governor of King's College Hospital for 18 years and has had long association with the National Heart Hospital.

Marryat and Scott, Ltd., announced the appointment of two new directors; **Mr. R. Walker** and **Mr. B. P. Hutton.** Mr. Walker has been secretary of Marryat and Scott Ltd., since 1928 and is also secretary of the recently formed public company, Marryat and Scott Holdings, Ltd. Mr. Hutton joined the company in 1932 and since then has been connected with sales and advertising in London and Birmingham, and as sales manager of the firm since 1945.

Mr. B. P. Hutton

OBITUARY

Mr. C. H. Phillips, late of the Sun Electrical Co., Ltd., died on January 15, aged 75. He joined Sunco in 1918 and retired in September 1944.

Mr. Taylor Croft, a former director of Contractors, Ltd., electrical engineers, of Pudsey, died recently while on a visit to Birmingham. Mr. Croft retired from business in 1946.

Mr. William Ross, formerly a well-known electrical engineer in the Aberdeen area, died recently. A former chairman of the Electrical Contractors' Association of Scotland, he retired in 1932 from the business of T. C. Smith and Co., and from the managership of Duncan's Electrical Supply Co.

Mr. S. L. Williams, section head in the accountancy department at headquarters of the Midlands Electricity Board, died recently, aged 58.

Mr. J. Harvey, who was consumers' engineer with the Bedford Corporation Electricity Department until his retirement in January, 1938, died on January 22, aged 79.

Mr. M. F. Willis, B.Sc., formerly an installation engineer with the Marconi Wireless Telegraph Co. Ltd., died on January 28, aged 63. Prior to retiring in 1948 he was at head office for a time.

Mr. J. W. Porter, assistant general manager of W. T. Glover and Co., Ltd., and a Freeman of the City of London, died on January 24. Mr. Porter joined the company in 1910. He served in the Royal Navy during the First World War; was appointed manager of the London office in 1924. He became joint sales manager in 1946 and was promoted assistant general manager in January, 1950. Mr. Porter was also a prominent member of the Battiwallah's Society.

Mr. J. W. Porter

NEW LITERATURE

Alternating-Current Circuits

by R. E. Kerchner, G. F. Corcoran.

CIRCUIT theory is an important part of the electrical engineer's basic studies, and it has the advantage in these days of restricted textbook publication, that by and large, the American speaking about it means the same as the Englishman. The book under review is the third edition of a successful American book for undergraduates, and in its early chapters it deals with the usual properties of a.c. circuits. In the later part of the work such matters as the determination of circuit parameters, transmission-line calculations and wave filters are covered. An excellent feature of this valuable book is the widespread use of photographs of actual oscillograms to illustrate the text. Published by Chapman and Hall, 598 pages, 9 in. by 5¾ in. Third edition, price 44s.

The Practical Engineer Pocket Book

ed. N. P. W. Moore, B.SC., A.C.G.I., D.I.C.

ONCE again several revisions have been made to the detail of this handy reference book to keep it up to date. In particular, the sections on the machining of materials and on welding and cutting have been completely rewritten and extended. Notes have been added to the steam section to indicate the use of diagrams in the solution of problems that arise. The valuable practice of incorporating extended references to sources of fuller information is continued, while the tables remain as full and clear as ever. Published by Pitman, 744 pages, 5½ in. by 3½ in., 64th edition. Price 12s. 6d.

Electrical Engineering Theory and Practice

edited by P. Kemp, M.SC.Tech., M.I.E.E.

AN attempt to cover in one three-volume work the whole range of electrical power engineering is nothing if not ambitious. Yet when this remarkable production is judged on the high standards it sets, it is not found wanting. Probably the greatest danger in books of this kind is that they should brush too lightly over some important branch of the subject: that is never the case in this three-volume compilation. Where subjects are treated at all, they are accorded good space and written of by engineers and teachers, most of whom are the authors of successful books on their specialities.

The three volumes cover, roughly, first, the basic principles of electrical engineering, the components of machines and such special details as cables, batteries and illumination. In the second volume, electrical machine theory and practice are forcibly presented. In addition, the supply industry is covered both as regards the steam, hydraulic and electric sides of generation, and the general principles and problems of transmission and distribution. In the final volume attention is focused on the applications of electricity, and its uses in many industries and in the home.

There is little doubt that the complete set of three volumes will be of outstanding value to any electrical engineering students lucky enough to acquire them at the beginning of their studies. Their quality is such that he is likely to retain and use them long after his formal studies are behind him. Published by Pitman, 1,964 pages, 9¾ in. by 7 in. Price for the three volumes, £10.

F.B.I. Register of British Manufacturers

INDICATIVE of the steady expansion in British industry is the enlargement that has become necessary in this now familiar annual. Although traders in this country will find it of immense value, its primary purpose is to promote Britain's export trade and in this connection it is unique in that it provides a substantial cross-section of the most important producers of British goods over a very wide range of industry. Admirably produced and strongly bound, the annual comprises seven sections, including an alphabetical list of over 6,000 F.B.I. members, their addresses, etc.; a classified Buyer's Guide, and trade names. For ease of reference overseas the information is classified in English, French and Spanish. It is, of course, the only authorised directory of the Federation of British Industries, and has been produced for them by Kelly's Directories Ltd., and Iliffe and Sons Ltd. 882 pages 9½ in. by 7½ in., price 42s.

BOOKS RECEIVED

Principles of Lighting, by W. R. Stevens. Advanced survey of whole field including practical applications. Published by Constable, 482 pages, 8½ in. by 5½ in. Price 35s.

Power System Analysis, by J. R. Mortlock and M. W. Humphrey Davies. Advanced discussion of problems and methods, based on the course held at Imperial College in 1949. Published by Chapman and Hall, 384 pages, 8¾ in. by 5¾ in. Price 45s.

Drawing Office Organisation. No. 4 of the B.I.M. Production Management series: originally B.S. 1100 part 9. Published by the British Institute of Management, 8 Hill Street, London W.1, 40 pages, 9¼ in. by 6 in. Price 5s.

Transmitting Valves, by J. Heyboer and P. Zijlstra. Book 7 in the Philips "Electronic Valves" series, discussing transmitting valves and their associated circuitry. Published by Cleaver Hume Press, 284 pages, 9 in. by 6 in. Price 35s.

Application of the Electronic Valve—Vol. II, by B. G. Dammers and others. Book 5 in the Philips "Electronic Valves" series, dealing with audio frequency amplification, the output stage, and power supply. Published by Cleaver Hume Press, 431 pages, 9 in. by 6 in. Price 45s.

The BUYER'S *Column*

"Foster H.I" Gear made by Crypton

RECEIPT of a new revised price list for "Foster H.I." heavy industrial fuse switches brings to notice the fact that manufacture of these units previously handled at the Wimbledon works of Foster Transformers and Switchgear Ltd., is now handled by Crypton Equipment Ltd., at Bridgewater, Somerset. Both of these companies are in the Lancashire Dynamo group.

New G.E.C. Cathode Ray Tube

A NEW type of cathode ray tube, 908 C.A.R.A., is announced by THE GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, for use in high-speed oscillography. The tube, which utilises electrostatic focussing and deflection, has a 9 cm diameter flat-faced screen coated with a highly actinic powder giving a blue fluorescence.

One stage of post-deflection acceleration is employed, which enables the beam to be accelerated after the main deflection has taken place. Connections to the front plates are brought out of the envelope via side arms, whilst the connections to the back plates and the third anode are taken through the base.

This new tube is the same as the Services type VCRX.294 and it has the same size and type of screen as the G.E.C. type 908 B.C.C., but differs in the following respects. (1) The 908 B.C.C. has five side arms; the 908 C.A.R.A. only two. The consequent saving of space is advantageous where a number of tubes have to be used in a multi-channel recorder. (2) It has a stage of post-deflection acceleration. (3) It is suitable for work which demands a better tube than the E.4412B9, but does not justify the use of the more elaborate 908 B.C.C. tube.

The operating conditions of the new tube, 908 C.A.R.A., are as follows:

Heater voltage	4 V
Heater current	1·1 amp
First anode voltage ...	2 kV
Second anode voltage (focus)	220 V approx.
Third anode voltage ...	4 kV
Post-deflection accelerator voltage	8 kV
Cut-off voltage	—70 V approx.
Back plate sensitivity ...	0·11 mm per V
Front plate sensitivity ...	0·08 mm per V

Multi-coloured "Tenawire"

P.V.C. covered wire has normally been limited to the standard range of self-colours. Many specification stipulate variations in shade for identification as unacceptable, so that, limited to the primary colour range P.V.C. has been out of favour although it has so many advantages.

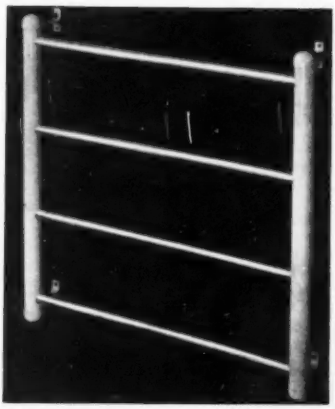
TENAPLAS LTD., Upper Basildon, Pangbourne, Berks, have now produced wires with two-colour identification. This has been made possible by the development of special pigments and lacquers which are highly resistant to abrasion, light, fast and resistant to most corrosive acids and solvants.

All standard gauges of wire, both single- and multi-stranded, are being produced with P.V.C. installations of all thicknesses in which the base colours of the P.V.C. have a superimposed lacquer spiral of different colours which permits colour coding. Colours can be to any specification.

An Economic Towel Heater Rail

BATHTIME comfort plus economy is the main virtue of the "Allton" towel rail which is marketed by ALLTON PRODUCTS CO., 45 Grove Ave., Moseley, Birmingham 13.

Bearing E.D.A. approval the towel rail is a solidly constructed appliance radiating "black"



The Allton towel airer is neat and well finished

heat from four horizontal bar elements which have a total rating of 100 W. Twenty-six inches wide and high and weighing only 6 lb, the appliance is an easily fixed efficient asset in any home.

The corner pieces are cast in aluminium alloy and are attached to vertical side tubes and finished in cream or black enamel or other special colours The element tubes are in well-polished duralium tubing.

Protection of Refractory Surfaces

A NEW range of refractory coatings designed for the protection of furnace interiors and other refractory surfaces under the trade name of "Furnascote" has recently been marketed by CORROSION LTD., 351 Coastal Chambers, Buckingham Palace Rd., London S.W.1.

The principal virtue of this new range is that by its usage and consequent protection of the

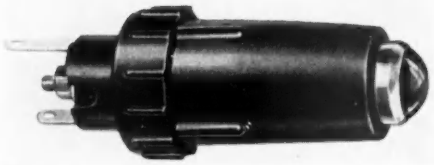
interior surfaces the efficiency of boiler and furnace installations is increased, thus effecting a saving in fuel.

In view of the shortage of refractory materials and their attendant high cost, it is most important to protect such surfaces from damage.

Two principal defects of refractory surfaces are their tendency to fail through "spalling" and "slagging". "Spalling" is the mechanical failure of bricks in service and is due generally to the too rapid heating or cooling of the brick. There are three types of "spalling": first, "thermal spalling," caused by localised rapid heating or cooling of the brickwork, the exposed surfaces cooling more rapidly than the interior and consequent cracking of the brickwork; second, mechanical "spalling," due to a change in physical condition of the surface layer of the brickwork; and structural "spalling," where too great a load is applied to the refractories.

Slagging, the other main defect, is the deterioration caused by materials and waste products produced through fusion.

"Furnascote" linings have been developed to overcome these defects and failures. They are easily applied with brush or spray by unskilled labour and are available in two types. Glazed—Loglaze 1521, Midglaze 1823, Higlaze 2230 and the universal type "Nonvit." All cover temperatures up to 3,500° F. A special mortar has also been produced by the firm for bonding, patching and plugging; this has a maximum temperature level of 3,000° F.



This illustration shows the new S.L. 92 signal-lamp holder which we featured in these columns in our 24 January issue

Philips' Farrowing Pen Heater

A NEW infra-red heating unit for farrowing pens has been introduced by PHILIPS ELECTRICAL, LTD., Century House, Shaftesbury Avenue, London W.C.2. It employs two Philips infra-red lamps, and consists of a fire-proofed hardboard and wood trough of roughly triangular section 31 in. long, 7 in. deep and 17 in. wide. Holes in the top member accommodate two special lampholders fitted with suspension rings, the only additions required being the actual suspending chain or wire and the electrical wiring.

The spacing of the lamps is suitable not only for pigs, but also for poultry and other livestock. The price is £3 2s. 6d. complete with lamps (no Purchase Tax).

TRADE PUBLICATIONS

BEARINGS.—Just issued by the Morgan Crucible Co. Ltd., Battersea Church Road, London S.W.11, are (*a*) Catalogue SD 40 supplementing (*b*) technical brochure SD 40, which give complete information regarding "Reservoil" oil retaining bearings which are produced by the company.

COLD CATHODE LIGHTING.—Micramatic Ltd., Wootton Mount, Old Christchurch Road, Bournemouth, Hants, have taken advantage of the present power supply situation to put forward the advantages of "Meico" cold cathode fluorescent lighting in situations where voltage fluctuations are frequent. A small handbill summarises these advantages.

CONTRACTORS' OFFICES.—"Sitemaster" caravan style mobile offices and dormitory units are featured in a brochure just issued by Stephenson Developments (Huddersfield) Ltd., Grosvenor Works, Linthwaite, Huddersfield.

ELECTRICAL EQUIPMENT.—A booklet issued by Ateliers Construction Electriques de Charleroi, with offices at 56 Victoria Street, London S.W.1, gives an excellent survey of the firm, its works in various parts of Belgium and its, indeed, wide range of products.

ELECTRIC COOKING EQUIPMENT.—Leaflets describing the Creda domestic cookers, Models E.V.L., E.V.12, E.V.13 and the Comet (DH.2), all made in the company's Blythe Bridge, Staffordshire, works, have been received from Simplex Electric Co. Ltd., Broadwell, Oldbury, Birmingham.

EQUIPMENT FOR STEEL MILLS.—Details of the electrical equipment supplied for use in the operation of the hot strip mills of John Summers and Sons Ltd., at Shotton, near Chester, are set out in an illustrated brochure issued by the English Electric Co. Ltd., Queens House, Kingsway, London W.C.2.

INDUSTRIAL SOLDERING.—Details of the wide range of "Viscol" soldering irons, metal pots and electrically-heated ladles are given in an illustrated leaflet which has been sent us by T. Leeman, 34 Palmerston Road, London W.3.

LUBRICATION.—No. 3 in the Vacuum Oil technical series of literature is devoted to a study of the problems of wire rope lubrication and the assistance which the Vacuum Oil Co. Ltd., Caxton House, Tothill Street, S.W.1, can render to engineers.

TERMINAL LINE BLOCKS.—Standard Telephones and Cables Ltd., Telephone Division, Oakleigh Road, New Southgate, London N.11, makers of many types of cables, are naturally experienced in the problems of joining single-core telephone-type wiring to stranded V.I.R. and similar types. They have therefore produced a range of terminal link blocks which they believe solve these problems. The range is described in a current brochure.

BRITISH STANDARDS

Dimensions and Nominal Voltages of Batteries for Valve-type Hearing Aids. *B.S. 966:1951. Price 2s.* This is a revision of the standard which was first published in 1949 and was restricted to high-tension batteries for hearing aids. It has now been expanded to cover both high-tension and low-tension batteries for such purposes and specifies the designation, nominal voltages, dimensions and methods of connection. The test to be employed to determine the contact resistance of battery socket contacts is also given.

Dimensions of Toroidal Sealing Rings. *B.S. 1806: 1951. Price 2s. 6d.* This standard, which was prepared at the request of the Ministry of Defence, applies to the dimensions of toroidal sealing rings, sometimes referred to as "O" seals, which are used as packings for reciprocating mechanisms and as gaskets for static purposes for light and medium general engineering applications. These sealing rings are not intended for use at pressures in excess of 1,500 lb/sq in.

For use as packings on reciprocating mechanisms 73 sizes are specified in the range of 1/8 in. to 8 in. and for static purposes 96 sizes in the range of 1/8 in. to 15½ in. This latter range includes the 73 sizes intended for reciprocating mechanisms.

Recommendations are also included for the recesses into which these rings are fitted, but the standard emphasises the necessity for close collaboration between the designer and the manufacturer of sealing rings to ensure satisfactory operation and service.

Parallel Dowel Pins (Steel) *B.S. 1804:1951. Price 2s.* A distinction between dowel pins, parallel pins and straight pins. Four grades of pin have been included. The grades follow the degree of accuracy of the diameter, the two most accurate being designated as precision ground dowel pins. The range of diameters and lengths for the precision ground dowel pins will cover all the normal requirements of the jig and tool industry. Such pins will be found invaluable for use in many forms of press tools and in numerous types of jigs. Material and limits of tolerance are specified while a table giving the dimensions and grades of pin normally available is included.

The publications noted above can be obtained at the prices stated from the British Standards Institution, 24 Victoria Street, London S.W.1.

Hotelympia 1952

Creditable displays show off Electricity's virtues

PARLIAMENT AND NATIONALISATION

THE Select Committee appointed to consider methods by which the House of Commons is at present informed of the affairs of the nationalised industry, and to recommend changes if necessary, will find food for thought in the speech given by Mr. D. N. Chester of Nuffield College, Oxford, to the Manchester Statistical Society.

Originally, the early advocates of the nationalised Board thought of it as a representatve body answerable to the people who had elected it and at one time there was a movement in favour of the election of management by the workers. Efficiency was, however, unlikely to be achieved by election from below, and the only hope of achieving it seemed to be to appoint men of known business ability to the Boards.

The question of accounting to Parliament was left rather vague. The nationalisation statutes had given Ministers considerable power to interfere with the public corporations, but Labour Ministers always stuck to their rights in refusing to answer questions about the work of the nationalised industries. The essential services with which the nationalised industries dealt could not be kept out of politics, and members were often frustrated because of their inability to get information. It was time to draw up rules about the information that Parliament could expect.

The shareholder in a joint stock company was content to leave everything to the management for he had a simple test of its efficiency, the dividend. There was no such simple test of the efficiency of a public corporation as the objective was not merely financial; it was also expected to perform some social purpose. Parliament was not only interested in the profit and loss account, but also in the interests of the consumers.

The implication was that the affairs of the nationalised industries should be investigated in more detail. But how was this to be reconciled with independence and efficient business management if those at the top were likely to be held up to obloquy in Parliament. Dare they delegate work if they will be blamed for the mistakes of subordinates? These were questions to which the Select Committee had to find the answers.

Lighting a *MOBILE FOOD HALL*

CONCERNED with maintaining their high standard of customer service, and recognising that housewives were hard pressed by their duties, Bentalls of Kingston were anxious to make their shopping easier. As a result of a proposal by the manager of the food department it was decided as an experiment to use a "mobile food hall" which would take out a variety of provisions to certain neighbourhoods at definite times during each week.

A 7-ton Dennis chassis with a specially designed body to give maximum storage space, was equipped with shelves and racks to accommodate £200 of stock of some 360 different items including groceries, bread and confectionery, sweets, vegetables, etc.

To accommodate enough stock to meet different requirements the interior fixings are arranged to provide maximum storage space with a centre aisle where salesmen and customers can move around comfortably. Good lighting of the interior was needed to enable quick service to be given by making it easy to pick out goods, give change and so on.

To get enough light for the job with the small ceiling area available for mounting fittings, it was decided to use a line of 1½ ft fluorescent tubes down the centre. The electricity supply at 200 V a.c. or more required for the fluorescent tubes is obtained from a rotary d.c./a.c. convertor operated from a "Young" 24-V armoured battery. This type of battery, manufactured by Crompton Parkinson, Ltd., has the "Young" patented armoured envelope enclosure of the positive plate which prevents paste shedding, and therefore short circuits, so that maximum reliability under conditions of heavy discharge and vibration is ensured.

THE WEEK

COMMERCE *in news* INDUSTRY

E.S.M.A. Seek More Lights

A REDUCTION of the restricted period during which electricity from the mains may not be used for advertising purposes is being sought by the Electrical Sign Manufacturers' Association, and a request to that effect has been made to the Minister of Fuel and Power. The association has asked that the restricted period end at 1 p.m. At present the use of public supplies is prohibited from Mondays to Fridays between 7 a.m. and 7 p.m. except for certain small signs showing that premises are open, which are allowed as from sunset.

Reason for the request is the considerably improved position as regards electricity supplies compared with that anticipated last October when the present restrictions were imposed. Mr. Bernard Moss, secretary of E.S.M.A., commented that members were prepared to bear the burden of restrictions if it was in the national interest but, should the need for cuts have passed they naturally expected at least a relaxation.

Token Imports—Quota Cut 25%

DETAILS of the token import scheme which is to be continued during 1952 in respect of Canada and the U.S. have now been given by the Board of Trade. A preliminary announcement was made earlier this month and was reported in our January 17 issue. Commodities included in the scheme will be the same as last year and import will be permitted up to 30% by value of each manufacturer's pre-war trade with the U.K. in each item. The quota for 1951 was 40%. Licences graded last year for imports under this scheme from Canada were valued at about £2½ million and from the U.S., at just under £2 million.

Training Schemes to be Reviewed

THE Ministry of Labour's proposals to regulate the supply of labour have the support of the National Joint Advisory Council, on which the British Employers' Federation, T.U.C. and nationalised industries are represented. The measures are understood to resemble the old Control of Engagement Order, imposing a duty on employers to notify vacancies to, and engage labour through employment exchanges. The proposals will now go before the Cabinet and later before Parliament.

At last week's meeting, the Council also considered proposals to make more efficient use of existing manpower. Some industries are to be asked to review their training schemes for young people and adults. Points which will probably be investigated are whether the scope of training arrangements can be widened, whether the period of training can be shortened, and whether the minimum age of entry into apprenticeship can be lowered. Consideration will also be given to a more intensive method of training whereby workers would be trained for a wider range of jobs, and to the removal or modification of the upper age limit to allow older workers.

Metal Pricing Changes

AS from today, January 31, a supplementary arrangement in regard to the pricing of copper, lead and zinc operates, the Ministry of Materials has announced. This is to facilitate the pricing of export orders by manufacturers. From today, orders may be placed on the Directorate of Non-Ferrous Metals, Rugby, by telegram, and provided telegrams are handed in to the Post Office not later than 2 p.m., the orders they contain will be priced at the price ruling on the day of despatch of the telegram. A licence will continue to be necessary before a sales contract can be completed and the amounts licensed will be limited to the quotas announced from time to time and notified to individual firms. All orders placed by telegram must be confirmed by letter with the necessary supporting documents, and no steps will be taken to supply the metal until such written confirmation is received. Telegraphic orders handed in to the Post Office after 2 p.m. will be priced at the price ruling on the day following the date of handing in. Orders placed by letter will continue to be priced on the day following the day of posting. All enquiries arising out of this announcement should be made to the Directorate of Non-Ferrous Metals, 20 Albert Street, Rugby.

The First Half Century

The London County Council has recently made attempts to convince the Board of Trade that the Electric Lighting Acts should be amended in order to give the Board of Trade auditors extended authority over electric lighting companies, especially in the metropolis. At present a Board of Trade auditor can disapprove of certain debits to capital account if, in his opinion they are not properly so chargeable, but he has apparently no power to make the companies amend their accounts in conformity with his views. It is urged by the L.C.C. that this free and easy method of dealing with capital charges might affect the local authorities, who would no doubt buy up the companies when their terms expire; and also the consumer, who is entitled to a reconsideration of the maximum price of supply every seven years or so.—*From our issue of January 30, 1902.*

In common with other consultative councils and organisations throughout the country, members emphasised the need to boost rural development. In the next financial year, it was stated, more help should be given to the agricultural industry of the Board's large rural area. A resolution to this effect was passed and forwarded to the Board.

Few Power Cuts, but Beware

ALTHOUGH the winter, and possibility of really severe weather, is by no means over, much of the danger of power cuts may be said to have passed. The comparatively mild winter is probably the main cause of this good fortune, but industrial load-spreading has undoubtedly played a large part. Load-spreading arrangements are due to end officially on March 31, but the East and West Riding Regional Board for Industry is to ask for power to bring the scheme to an end before that date, providing favourable conditions continue. The Y.E.B. is to consider the matter at its next meeting.

In a similar vein, it has been announced by the Scottish Board for Industry that staggered working hours in Scottish industry will cease within the next week. As a result of the improvement in the supply position, firms will from the same date reduce consumption by 10% instead of 20% as at present. Staggered hours were introduced to effect this economy. The total saving actually made was 90,074 kW or 20·1%.

A warning against complacency at the present situation, however, was given by the N. Midlands Board for Industry. Despite the absence of cuts in the E. Midlands Board's area, consumers should not be lulled into a state of false security—cuts would be inevitable in February and March if the weather worsened, the Board warned.

London Meter Readers Return

METER readers employed by the London Electricity Board who came out on strike over the appointment of supervisors, returned to work on Wednesday of last week, after agreement had been reached between leaders of the E.T.U. and representatives of the L.E.B. and the B.E.A. at the Ministry of Labour. The meter readers have resumed duties, in some cases going out with supervisors, as was earlier proposed, we learn. Under the agreement, the L.E.B. is to supply to the unions concerned the information supporting the Board's contention that "there is considerable redundancy among meter readers in London," and the unions will consider this data. At the moment the Board is preparing a new standard of work for the men. It was also agreed that any men to be discharged will be selected on the principle of "last in, first out." The rates of pay and conditions of employment of the supervisors are to be discussed in the joint negotiating machinery.

OFFICIAL PUBLICATIONS THIS WEEK

NAVAL ELECTRICAL MANUAL. Vol. I. H.M.S.O., 21s. *(Formerly out of print, now re-issued).*

DOLLAR EXPORTS. H.M.S.O., 12s. 6d. *Sales to public authorities in U.S. Survey of purchasing legislation and practice.*

E.R.A. REPORTS.

L/T 250. *Static and dynamic rheological properties of dielectrics* (price 9s. 3d.); *W/T* 20. *Differential effects in high-frequency dielectric heating* (price 6s. 3d.); *W/T* 22. *A problem in radial heat flow* (price 7s. 9d.). *(Obtainable from E.R.A., Thorncroft Manor, Dorking Rd., Leatherhead.)*

OVERSEAS ECONOMIC SURVEY
BOLIVIA H.M.S.O., 1s. 6d.

301 kV Cable Contract Secured

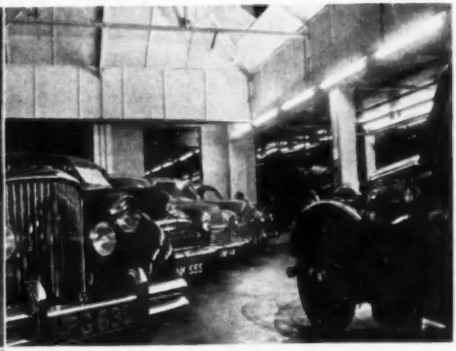
AN order for single conductor oil-filled cable and sealing ends to form a 750 yd termination for an overhead line in Canada operating at 301 kV has been received by Pirelli-General Cable Works Ltd. An order for a similar termination has been placed with a Canadian cable manufacturer, but it is a tribute to Britain that part of the first order for such a cable should have been placed in this country. This cable is to be used in connection with a new melting plant of the Aluminium Co. Ltd. of Canada, which will be situated on a site at Kitmet, some 400 miles from Vancouver.

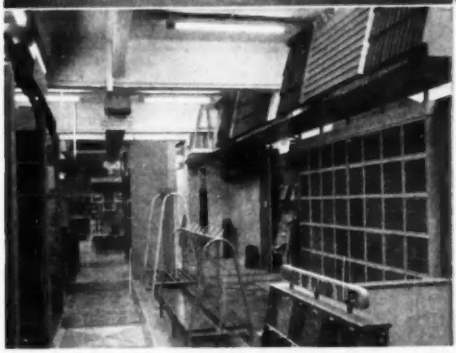
Precautions in B.E.A. Control Rooms

PART of the precautionary methods adopted at B.E.A.'s control rooms at Paternoster Square, London, involve a signalling system, remote control and private telephone network linking the rooms with the principal grid substations and power stations in areas extending north and south of the Thames. Three Chloride batteries totalling 249 cells have been installed recently to ensure that the system is kept in full operation under all circumstances. The batteries are float-charged on constant voltage chargers and a maximum stand-by capacity is always available. Two a.c. supplies from different sources have been provided, as well as a stand-by diesel set and small rotary converter to give in an emergency a.c. from the batteries' d.c. where required.

Standing Order Suspended

THE suspension of a Standing Order to facilitate the award of a contract to the Midlands Electricity Board by Stoke City Council, was objected to at a recent meeting of the E.C.A.'s Potteries Branch. At the city council's December meeting a recommendation was approved whereby a quotation of £890 by the M.E.B. for internal lighting and heating of Ford Green Hall be accepted. Standing Orders of the Council with regard to advertising were therefore to be dispensed with. An amendment at the Council meeting proposing the reference back of the recommendation was defeated. The electrical contractors were unanimous in the view that suspension of Standing Orders relating to contracts should cease, except in the cases of proved emergency, as the Orders were framed to prevent the mis-spending of public money. A resolution to this effect was forwarded to the Town Clerk.





Cardiff E.C.A.'s 17th Dinner-Dance

THE country could not really afford the five-day working week said Mr. S. N. Watkins, national president of E.C.A., at the 17th annual dinner-dance of the Cardiff branch. No man who worked 48 hours a week and played 120 hours was doing the right thing for the country, he said. He was responding to the toast of the E.C.A. proposed by the Lord Mayor of Cardiff who said that the city's electrical plant had cost about £4 million of the ratepayers' money and brought in a revenue of £32,000 a year. He complained that not only had they lost the revenue but the amount paid in compensation was almost negligible.

E.C.A. asks for Equal Terms

SPEAKING at the sixth combined annual dinner of the Tunbridge Wells, Maidstone and E. Kent branches of E.C.A. last week, Mr. J. Rodgers, M.P. for Sevenoaks, proposing the toast of the Association, said private enterprise could beat nationalised boards every time. Competition between the two, however, should be on equal terms. President of E.C.A., Mr. S. N. Watkins, replying, stated that increased output was the only way to counter the high prices which were having serious repercussions in the trade. He doubted if the electrical industry had ever been so prosperous before but asked if the nationalised undertakings were not taking the plums away because of its great capital.

Fluorescent Installations

OUR three illustrations of lighting schemes consist of installations carried out by the British Thomson-Houston Co., Ltd., and Metropolitan-Vickers Co., Ltd. The photograph (bottom left) shows a section of the Building Centre's new premises—details of which were given in our January 10 issue—where the arrangement of fluorescent fittings was largely determined by existing architectural features. Single-lamp fittings have been mounted flush to the ceilings by the B.T.H. The scheme at Henleys Ltd.'s car sales showroom (above) also carried out by B.T.H., consists of two rows of fluorescent fittings mounted over the front windows and on the side of the wall. At the Pontypool factory of British Nylon Spinners Ltd. (top left) about 1,700 Metrovick 5 ft 80W fluorescent lamps and fittings have been installed to give one of the most efficient lighting schemes under those conditions.

The Future of Design Review

AT the close of the Festival of Britain, the Council of Industrial Design announced that their exhibit "Design Review," a photographic index of manufacturers' 1951 stock lists, was to be continued in a modified form. Further details of the exhibit have now been given. It will be at Tilbury House and in its new form—confined to durable consumer goods—will comprise seven sections. These will include one devoted to domestic appliances and an additional section assigned to "street furniture," which will include equipment used for street lighting, as a guide to local authorities. As a start, it is to comprise some 5,000 items but the Council necessarily relies on the co-operation of manufacturers for keeping "Design Review" up to date.

Mersey Transport Problem

ONE of the suggestions put forward in a memorandum on Merseyside transport prepared by Mr. G. S. F. Robson, director of the Lancashire and Merseyside Development Association, is the extension of the electric railway line from Rock Ferry to Ellesmere Port. This, it was stated would greatly assist the new industrial projects developing in that district. The most urgent problem con-

Some of the guests who were among the 400 or more members of the Cardiff Business Club at the club's dinner last week. From left to right are : Mr. E. Hywel Jones, chief generation engineer, B.E.A., S. Wales Division; Mrs. G. H. Bowden; Mr. G. H. Bowden, of Johnson and Phillips Ltd., club chairman; Dame Caroline Haslett, who addressed the gathering; Mr. L. Howles, chairman of S. Wales Electricity Board; and Mr. W. S. Gearing, also of Johnson and Phillips Ltd.

cerns the Speke industrial estate and conversations were to take place between representatives of Liverpool Corporation and the Railway Executive in an endeavour to alleviate the difficulties. It was felt that the whole burden of transporting workers to and from the new industrial estate could not be carried by road.

Home Lighting

WE learn that a new subject—"Home Lighting"—is to be included in the Council of Industrial Design's residential course for retail salesmen. The subject is to be covered by Mr. T. O. Freeth of E.L.M.A.'s Lighting Service Bureau. Details may be had from the Council's Retail Offices, Tilbury House, Petty France, S.W.1.

Synthetic Adhesives

"MODERN Synthetic Adhesives" was the subject of an address by Mr. P. A. Dunn of Aero Research Ltd., at last week's meeting of the Purchasing Officers' Association's East London branch. Synthetic resin adhesives had only existed for about 20 years, he said, and were the main glues in the group that set by chemical change. The largest field of use of these adhesives was in the bonding of wood, but Mr. Dunn added, they were also employed in metal to metal bonding, rubber to metal, wood to metal and metal to ceramics and plastics.

Old Folks' Home is "Commercial"

NEW arrangements, no matter how well thought out they may be, are almost bound to have an adverse effect on somebody. Such an instance has occurred following the introduction of new tariffs by the Midlands Electricity Board. A home for old people receiving their quarterly account were concerned at an increase of some 400% in the basic charge, and on enquiry were told that as the floor space was above the specified area, the home could not be termed as "domestic." The home was therefore classified as "commercial," with a consequent rise of some 2½d. a unit. The Board's sub-area manager has subsequently explained that the task of converting about 200 tariffs to only seven was a large one, and that a further interview with the proprietors of the establishment would be arranged so that the matter could be sorted out.

E.A.W. Annual Awards

TWO awards made annually by the E.A.W. were announced last week. The Elizabeth Sloan Chesser Cup, presented to the demonstrator gaining highest marks in tests for the Association's Diploma in Electrical Housecraft, was won by Miss M. B. Morris of Tenby. The diploma was awarded to 15 candidates during 1951. The Clr. Miss Walter rosebowl was won by the S.E. Essex County Technical School, as the school gaining the highest average marks in the Home Workers' Certificate exam. This is the third occasion on which the school has won the trophy.

Emblem for Engineers' Guild

EIGHT designs were entered for the emblem competition arranged by the Engineers' Guild in an endeavour to find a suitable crest for the organisation. The prize of £5 offered for the best design submitted, has been awarded to Mr. J. B. W. Dawkes, of Cardiff, whose suggestion is reproduced here. It is understood, however, that the Council is not yet satisfied that this emblem should be adopted and official sanction has been held in abeyance for further consideration.

Prospects in the Building Industry

A NUMBER of points were made concerning available supplies and prospects of the building industry by the Rt. Hon. David Eccles, Minister of Works, at a luncheon given by the London Master Builders' Association last week. In regard to supplies of materials, he said, there would be strong claimants for the million tons of steel from the U.S., and it would be a long time before we could afford to forget that every ton saved could be used to swell Britain's earnings overseas. One way in which it was intended to ease the shortage was to secure a better supply of reinforcing rods and wire for pre-stressed concrete. Mr. Eccles said an allocation scheme always started something of a panic but usually turned out better than was generally expected.

Production of cement was rising and it was hoped the needs of the home market would continue to be met. Supplies of cast iron goods and pipes were a problem, but advancement was being made in the right direction. Finally the Minister said it was not possible to do away with the starting date procedure, as the Government had to have power to see that work of high national importance was started and completed.

£302 million of Purchase Tax

DURING the 1950-51 financial year, purchase tax accounted for £302½ million of the total of £1,630 million revenue accrued by H.M. Customs and Excise. Both these figures were records. Purchase tax revenue was, in fact, 3% higher. The value of trade taxed has been estimated at £750 million, a rise of £30 million.

Manufacturers say "Abolish P.T."

AMONG points made by the National Union of Manufacturers in a budget memorandum submitted to the Chancellor of the Exchequer are the abolition of purchase tax, discontinuation of profits tax on undistributed profits and the need to restore the initial allowances for replacement of plant and machinery at not less than 40%. In regard to purchase tax, the Union states that this should be abolished at the earliest possible date, if not at one stroke then restricted as a start to one rate of tax, and that the lowest rate. The fall in revenue, it is stated, would be compensated by the proposed economy in public expenditure. The Union urges that the proposed excess profits tax should embrace all taxation of business profits (apart from income tax) and existing profits tax on distributed profits should be discontinued.

Colombo Plan Exhibition

SOUTH-EAST Asia has been much in the news in recent years and the welfare of nations in that part of the world has caused not a little concern. The Colombo Plan is a step to improve conditions in those undeveloped areas and promote a better economy, and the purpose of the plan as well as measures being taken to those ends, are to be portrayed in an exhibition at Colombo between February 16 and March 14. It is to be opened by H.R.H. the Princess Elizabeth. Some 15 countries, including the U.K., will be taking part in the display of goods, which will cover an area larger than the South Bank Site in London.

We learn that among British exhibitors will be the Brush A.B.O.E. Group, whose display is to include a model of the Ljungstrom turbo-alternator, a 10 h.p. slip-ring motor and h.b. switchgear panel. Throughout the exhibition the Group's film "Power" will be shown. Participation in this exhibition is in keeping with the Brush policy of furthering technical education in the Commonwealth.

The current window display in English Electric Co. Ltd.'s London showrooms incorporating the plate-warmer and food-mixer. Design is based on current advertising and the slogan "Bringing You Better Living"

Sales Management Exam. in 1952

QUALIFYING and final examinations in "Sales Management" staged by the Incorporated Sales Managers' Association are to be held this year on May 22, 23 and 24 in London and various provincial centres. At the same time it was announced that a revised six-subject qualifying exam. will be introduced in 1953 in lieu of the present examination consisting of three subjects only. The new arrangement will bring the test into line with the National Certificate scheme in Management Studies. Entry forms and particulars of this year's exams. may be had from the Secretary, 4 Holborn Place, W.C.1. Closing date for receipt of applications will be April 30.

NEWS IN BRIEF

N. Staffordshire University College, Keele, has received a joint gift of 5,000 guineas from the B.E.A. and Midlands Electricity Board for study and research in those branches of physics connected with electricity.

The Radio Communication and Electronic Engineering Association's members made direct exports worth £6 million during 1951—a 600% increase over 1946 figures.

A commemorative plaque to Mr. J. L. Baird, the television pioneer, is to be fixed to the wall of No. 1 Station Road, Bexhill, where he lived for many years. Cost is to be borne by Bexhill council.

This year's Royal Netherlands International Industries Fair, the 58th, will be held at Utrecht from March 25 to April 3. Particulars of this exhibition may be had from the U.K. representative, W. Friedhoff of 10 Gloucester Place, W.1.

Extended hours of opening of the Patent Office Library in Chancery Lane, W.C.2, are to be continued. They are 10 a.m. to 9 p.m. on Mondays to Fridays and 10 a.m. to 5 p.m. on Saturdays.

Electric Supply News

Bridlington

The rural district council is to ask the Yorkshire Electricity Board to place as many cables as possible underground in future. One member asked if the time had not come when they should ask for new estates to have underground cables, as in Flamborough they were getting an awful tangle of overhead wires.

Durham

A further instance of discrimination in charges for electricity supply from collieries, is given in a report that non-miner consumers at Herrington are charged by the Durham Coal Board 10% more than miners for their electricity supplies. The matter has been taken up by Mr. W. R. Blyton, M.P., for Houghton-le-Spring. Before nationalisation of the mines, electricity was supplied by Lambton, Hetton and Joicery Collieries, Ltd., without any discrimination, it is stated.

North Wales

Refuting allegations made by the North West Wales Rivers Board (p. 182, Jan. 24 issue), Mr. J. Warnock, hydro-electric engineer to the Merseyside and North Wales Division of the B.E.A., has pointed out that the Authority does not propose to export all the water-generated electricity from North Wales to the Midlands. The position was that in the North Wales area 690 million units were used last year. But only 104 million units could be generated in the area, so that 85% of consumption had to be imported from England. At the present rate, the probable consumption in North Wales in three years' time would be 900 million units. Therefore there was no hope of electricity being available for export to England by that time. Referring to the proposed schemes in Nant Ffrancon and Snowdon, Mr. Warnock said he could foresee that when they came into operation a great deal of opposition to them would disappear.

Plymouth

Criticism of the new tariffs introduced by the South Western Electricity Board has been made in a report of the General Committee of the Plymouth Incorporated Mercantile Association. The committee considers that the increases on such a scale were not justified, and is of the opinion that industrial and commercial consumers will discover that in a large majority of cases the charges for electricity will be increased under the new tariffs by 50% to 100%. Having regard to the last published accounts of the Board an increase on the scale under the new tariffs is not justified, it is submitted. Replying to this criticism, Mr. N. Axford, the Board's district manager, has pointed out that the increases were necessary because tariffs previously in force had not been regularly adjusted to the rise in costs. Even in the year before nationalisation, the Corporation Electricity Department made a loss of £34,201.

Staffordshire

Among extensive plans to develop Staffordshire's coal mining, power, gas and water resources, referred to in the county council's draft development plan just issued, it is stated that a new power station at Rugeley will be started in 1953 or 1954, to utilise coal from a new mine. The task of reconstructing the older part of the Ocker Hill power station at Tipton will be carried out between 1953 and 1956. The possibility of constructing a new 275 kV grid for transmission of power in bulk is being considered, it is recorded.

S.W. Scotland

A proposal for the establishment of an Ayrshire generating station to use the large quantities of poor quality coal available locally, was under discussion at the moment, Mr. W. Hutton, deputy chairman of the South West Scotland Electricity Board, revealed last week. If the scheme was approved it would have an output of about 30,000 kW, he added. Mr. Hutton was giving an explanation of why the Board had been compelled to increase its tariffs, due to the rising costs of materials, etc., and instanced coal which four years ago cost just over 50/- per ton, today cost 67/3d a ton. A large proportion of the coal used in the S.W. Scotland area had to be brought from Fife at an added cost of 15/- a ton for haulage. Complaint had been made to the Central Authority about that additional cost, he went on, and they had reinforced their case by stating that the area they were supplying with electricity was still producing more than half the coal mined in Scotland. Mr. Hutton also claimed that of the 14 Area Boards, the S.W. Scotland was the first to achieve standardisation of tariffs.

Trafford

The Metropolitan Vickers 15 MW gas turbine now being installed at Trafford power station of the North Western Division, B.E.A., is expected to be the first gas turbine in this country to generate electricity for public service. The unit, which should be in commission this spring, has the advantage of being self-contained as distinct from a steam-driven unit, with no attendant boiler plant. It is much lighter in weight and should be able to run up to full load in a matter of minutes. The plant has been erected on the site of the old station boiler house, which contained nine boilers. Initially, it is proposed to bring oil fuel by road tanker, and two 500-gallon reserve tanks are now being built.

LIGHTING SCHEMES

St. Asaph.—The M.o.T. has refused to approve a loan of £1,059 to complete the second part of the parish council's scheme for lighting side streets, unless it can be shown to be essential.

Birkenhead.—A scheme for improved lighting of Grange Road West and Charing Cross, at a cost of £1,498, has been approved by the Watch Committee.

Jarrow.—The Borough Engineer is to report on the cost of changing street lighting in the old part of the town from gas to electricity.

Luton.—T.C. to submit to M.o.T. for approval a scheme for fluorescent lighting in George Street (£3,900), and the conversion to sodium lighting in twelve roads (£12,830).

Margate. — The Lighting Committee has approved a scheme prepared in conjunction with Thorn Electrical Industries Ltd., for a test of wall-mounted fluorescent street lighting equipment at fifteen points in the High Street.

Morecambe and Heysham.—The T.C. is appealing for £10,000 to be subscribed by traders and local organisations who derive benefit from the illuminations.

Plymouth.—T.C. has obtained sanction to borrow £10,029 for mercury vapour lighting in Buckwell Street, Worsley Road and Alexandra Road, Matley.

Sunderland.—The T.C. Seaside Development Committee has decided to hold another illumination display at Seaburn this year. (Last year's display resulted in a loss of £9,000.)

Swadlincote.—U.D.C. has received M.o.T. authorisation to carry out the amended third stage of the street lighting scheme, at a cost of £3,217.

Walsall.—The Public Works Committee recommends approval for a scheme of electric street lighting along the West Bromwich route A4031, consisting of 70 m.v. lamps, at a cost of £4,900.

Company Activities

A.C.E.C. (Ireland) Ltd.

Earlier this week Irish investors were given the opportunity to take up £150,000 worth of Cumulative Preference shares at 6% in this recently formed subsidiary of the Belgian concern. It is hoped that production will start next month.

Cable and Wireless (Holdings)

The preliminary statement shows a profit of £541,000 for 1951, before taxation. There is recommended an Ordinary dividend of 6% and a bonus of 2%. U.K. taxation absorbs £216,000 (*£187,000*), leaving a net balance of £325,000 compared with £182,000 for 1950, which included a net sum of £22,000 in respect of previous years. The proposed Ordinary dividend requires £210,000 (*£165,000*), and the sum of £100,000 is transferred to general reserve. In 1950, the amount of £935,000 was transferred to reserve out of profits brought forward from previous years.

Dussek Brothers and Co.

A consolidated net trading profit of £136,746 (*£105,006*) for the year to October 31 is shown in the full accounts. Other income brings the total to £137,022 (*£105,396*). After directors' fees, depreciation, etc., the net profit is £96,103 (*£71,470*). The sum of £13,000 (*£12,000*) is transferred to stock reserve, and £9,400 to taxation equalisation reserve. Dividends absorb £13,779 (*£14,396*).

Electric and Musical Industries

The directors are to offer to Ordinary stockholders 1,741,724 new Ordinary shares of 10s. each (equivalent to £870,862 Ordinary stock in units of 10s. each) at 12s. 6d. per share in the proportion of three new shares for each ten units of Ordinary stock held. The issue will raise a gross sum of £1,088,577, and the net proceeds are estimated at £1,046,000 which will be applied in reduction of the bank overdraft. It is intended that the new shares will be converted into stock transferable in units of 10s. which will rank *pari passu* in all respects with the existing Ordinary stock. An extraordinary general meeting is called for February 15. In a notice to shareholders, Mr. A. Aikman, chairman, points out that the consolidated balance sheet at June 30 last showed bank overdrafts of £519,502. During the five months to November 30 last, there were further increases of stock and work in progress, and debtors' accounts, with the result that bank borrowings in England had risen to approximately £2,500,000.

Radio Rentals Ltd.

For the year ended August 31 last, the directors have recommended a final Ordinary dividend of 20%, making 30% for the year (*same*). Net profit for the year amounted to £157,434 (*£153,256*) after charging all expenses, depreciation of radio and television sets and taxation. Consolidated net profit of the group amounted to £172,150, calculated on the same basis, compared with £171,952 last year. In addition to the profits referred to above, a sum of £27,440 is added back in the profit and loss appropriation account. That adjustment comprises provisions made in prior years, mainly taxation, which are no longer required. It is also announced that the directors propose to offer 100,000 Ordinary shares of 5s. each to shareholders at 10s. per share by way of provisional allotment on the basis of one new share for every eight Ordinary shares held.

Dividends Declared

Broom and Wade.—Final Ordinary dividend of 7½%, making 11½% (*15%, of which the interim of 7½% was on smaller capital*).

Globe Telegraph and Trust.—Interim Ordinary dividend of 3% (*2½%*), payable on February 25.

Redfern's Rubber Works Ltd.—Final Ordinary dividend of 5%, making 10%, plus bonus 10%.

Commercial Information

CONTRACTS OPEN

HOME

Feb. 1.—Belfast. Supply and erection of three-phase 33 kV oil-immersed reactor of non-ferrous shielded type. Tenders also invited by Feb. 15 for supply and erection of chlorinating plant with pumps and all associated equipment. Merz and McLellan, consulting engineers, Carliol House, Newcastle-on-Tyne. Deposit in each case, £5 5s. (See Jan. 10 issue.)

Feb. 1.—Belfast. Tenders are being invited by Electricity Dept. for annual supply of stores, including transformer oil, transformer kiosks, insulated cables, lamps, washboilers, kettles, etc. Dept. is at East Bridge St., Belfast. Deposit 10s. (See Jan. 10 issue.)

Feb. 1.—Southgate B.C. Supply of 135 lanterns and control gear for 250 W mercury vapour lamps, and supply and erection of 135 concrete standards and fixing of lanterns, control gear, wiring, etc., for Group A lighting. Applications by above date to Borough Engineer and Surveyor, Southgate Town Hall, Palmers Green, N.13. (See Jan. 24 issue.)

Feb. 1.—Stafford T.C. Provision and erection of a number of automatic-controlled electrically driven centrifugal pumping units. T. H. Higson, Borough Engineer and Surveyor, Mount St. Deposit £3 3s.

Feb. 1.—Tottenham. Supply of electric lamps required. M. Lindsay Taylor, Town Clerk, Town Hall, Tottenham, N.15.

Feb. 2.—Peterborough. Lighting and power installations to 50 houses on Mountsteven Ave. estate. Applications by above date to F. J. Smith, City Engineer and Surveyor, Town Hall. Deposit £2 2s. (See Jan. 24 issue.)

Feb. 2.—Prestwich T.C. Lamps and electrical equipment included in supplies wanted for 12 months ending Mar. 31, 1953. Borough Engineer, Town Hall.

Feb. 2.—Scunthorpe T.C. Electric lamps included in supplies wanted for year ending Mar. 31, 1953. Cyril Cooper, Borough Surveyor, Comforts Ave.

Feb. 4.—Birkenhead T.C. Renewal of electrical installation at 9, 10 and 12 Hamilton Sq. Borough Architect, 25 Hamilton Sq.

Feb. 4.—Hendon T.C. Supply and installation of open-type lanterns for 140 W sodium lamps with transformers, condensers and ancillary equipment for lighting of North Circular Road between Brent Cross and Edgware Rd. Also supply of reinforced concrete columns for same scheme. These are separate contracts. A. O. Knight, Borough Engineer and Surveyor, Town Hall, N.W.4. Deposit £2 2s. in each case. (See Jan. 17 issue.)

Feb. 4.—Lancashire. Electrical installation at Leigh hostel for aged. Applications by above date to County Architect, County Hall, Preston. Deposit £2 2s.

Feb. 4.—Stoke-on-Trent. Electric lamps included in list of supplies for six months ending Sept. 30 next. City Surveyor, Town Hall.

Feb. 4.—West Riding. Installation of electricity at Mental Occupational Centre, Keighley. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

Feb. 4.—Wicklow (Eire). Electrical installation at County Fever Hospital. Consulting engineer, J. C. Costello, 21 Leeson Park, Dublin. Deposit £5 5s.

Feb. 5.—Scottish Gas Board. Supply of electric lamps wanted for year beginning April 1. Divisional Controller of Board, Glasgow Division, 30 John St., Glasgow.

Feb. 6.—Derby T.C. Electrical installation to 80 houses on Mackworth estate. Borough Architect, The Council House, Corporation St. Deposit £2 2s.

Feb. 6.—Manchester. Supply of (a) bowl reflector lanterns for 80 125 W H.P.M.V. lamps, and (b) sets of auxiliary equipment for 125 W H.P.M.V. lamps; for year ending Dec. 31, 1952. City Surveyor, Town Hall, Manchester 2. (See Jan. 17 issue.)

Feb. 6.—Manchester. Supply of Group B concrete street lighting columns during year ending Dec. 31, 1952. City Surveyor, Town Hall. (See Jan. 24 issue.)

Feb. 6.—Northumberland. Lighting installation at Hexham grammar school. Names to County Architect, County Hall, Newcastle, by above date. Deposit £2 2s.

Feb. 6.—Gt. Yarmouth T.C. Supply of cables wanted for one year from April 1. Borough Engineer, Town Hall. (See Jan. 24 issue.)

Feb. 7.—Mitcham (Surrey) U.D.C. List of supplies wanted for 12 months from April 1 includes electric lamps. Borough Engineer and Surveyor, Town Hall.

Feb. 8. Manchester. Electrical installation at Hawthornden, Palatine Rd. City Architect, Town Hall. Deposit £1 1s.

Feb. 8.—Runcorn U.D.C. Supply of electric lamps required for year ending Mar. 31, 1953. T. J. Lewis, Clerk of the Council, Town Hall.

Feb. 9.—Bedworth U.D.C. Provision and erection of 103 reinforced concrete lamp columns with 80 W mercury lamps and all equipment. Engineer and Surveyor to Council, 134 Neston Rd. Deposit £3 3s. (See Jan. 24 issue.)

Feb. 9.—Down. Installation of lighting and power circuits and fire alarm system at St. Leonards West, Warrenpoint. D. W. Bell, 41 Royal Ave., Belfast. Deposit £3 3s.

Feb. 9.—Halifax T.C. Re-electrification of Haugh Shaw primary school. Borough Engineer, Crossley Street. Deposit £2 2s.

Feb. 9.—Swansea T.C. Lamps for public lighting and lamp pillars included in list of supplies wanted by year beginning April 1. Borough Engineer and Surveyor, Guildhall.

Feb. 11.—Bath. Electrical installation in Julian Rd. flats. Architects are Hugh Roberts and Davies, 7 Brock St. Deposit £1 1s.

Feb. 11.—Buxton T.C. Supply and installation of (a) 12 lanterns, MAF/V 400 W lamps, control gear and concrete columns for Group A lighting along London Rd.; and (b) 24 lanterns, MBF/V 80 W lamps swan-neck pillar mounting con-

version brackets with control gear for Group B lighting along three roads. Borough Engineer, Town Hall. Deposit £2 2s. (See Jan. 24 issue.)

Feb. 11.—N. Ireland. Ulster Transport Authority requires supplies of steel conduit and fittings for electrical wiring, lamps, cables and flexibles and electrodes during 12 months beginning Apr. 1. Stores Superintendent, Duncrue St., Belfast. Charge 1s.

Feb. 11.—Stalybridge, Hyde, Mossley & Dukinfield T. & E.B. Installation of electric light and power for new bus garage. Architects, Howard and Benson, 88 Mosley St., Manchester 2. Deposit £2 2s.

Feb. 11.—West Riding. Installation of electricity at Goole and Pontefract Willow Park schools. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

Feb. 12.—Bath. Supply and erection of twin electrically driven automatic pressure controlled centrifugal pumps. City and Waterworks Engineer, 8a Terrace Walk.

Feb. 13.—Huddersfield T.C. Supply of materials for 12 months ending Mar. 31, 1953, includes tungsten filament, mercury vapour and sodium lamps. Borough Engineer and Surveyor, High St. Buildings.

Feb. 14.—Merthyr Tydfil T.C. Electrical installations at Pentrebach infants', Edwardsville junior mixed, Woodlands, Brecon Rd. infants' and Merthyr R.C. schools. Also the same at Caedraw junior mixed, Queens Rd., Pant and Dowlais infants' schools. These are separate contracts and deposit in each case is £2 2s. Borough Engineer's Dept., Town Hall. (See Jan. 17 issue.)

Feb. 15.—Belfast. Supply and erection of bulldozer with capacity of 120 tons coal per hour, minimum h.p. of 100 for engine, for Victoria power station. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (See Jan. 17 issue.)

Feb. 15.—Castlebar (Mayo). Electrical installation in County Clinic. E. R. Ryan, consulting engineer, 1 Montpellier Terrace, Galway. Deposit £10 10s.

Feb. 15.—Sheffield. Electrical installation in secondary school for girls at Hurlfield. W. Geo. Davies, City Architect, Town Hall. Deposit £2.

Feb. 16.—Harpenden U.D.C. Erection of 40 reinforced concrete columns with lanterns in Class B. Engineer and Surveyor, Harpenden Hall. Deposit £1 1s.

Feb. 16.—Solihull U.D.C. Supplies required for year includes electrical fittings and lamps, concrete lamp columns, street lighting fittings. Engineer and Surveyor, 90 Station Rd.

Feb. 18.—Bury St. Edmunds T.C. Inspection and maintenance of electrical equipment and installations in houses on Mildenhall Rd. estate. Borough Engineer and Surveyor, Borough Offices, Angel Hill.

Feb. 18.—Manchester. Electrical installation at "Barfield" and "Southernhey," West Didsbury. City Architect, Town Hall. Deposit £1 1s. (Advertised in this issue.)

Feb. 19.—Poole T.C. List of supplies for year ending Mar. 31, 1953, includes electric lamps, cables, fittings, water heaters, control units, street lighting lanterns, concrete columns, electric conduit and wiring accessories. J. R. Barron, Borough Engineer and Surveyor, Municipal Bldgs.

Feb. 20.—Hertfordshire. Electric lamps included in list of supplies for year beginning April 1. Central Purchasing Officer, The Old Rectory, Hatfield.

Feb. 25.—Hastings T.C. Rewiring of electrical installation at Clive Vale secondary school. Borough Engineer, 37 Wellington Sq. Deposit £2 2s.

Feb. 25.—Herne Bay U.D.C. Supply and installation of two electrically-driven sewage pumping units each of 500 g.p.m. capacity, with switchgear, etc. W. W. Smith, Engineer and Surveyor, Council Offices. Deposit £2 2s.

Feb. 26.—Towcester (Northants) P.C. Supply and installation of 28 fluorescent street lighting units to Group A on trunk road A.5. A. E. G. Kemsley, Clerk of Council, 5 Burcote Way. (Advertised in this issue.)

Feb. 27.—Birkenhead. Lamps and cables included in list of supplies required for year beginning April 1. Transport Manager, Transport Offices, Laird Street.

Feb. 27.—Tynemouth T.C. Supply and erection of four electrically operated pumping units, each of 1,300 g.p.m., at Mitford. Water Engineer and Manager, 8 Northumberland Sq., North Shields. Deposit £3 3s.

Feb. 28.—Dewsbury T.C. Supply of electric lamps, cable, lanterns, lighting columns. C. H. Midson, Street Lighting Engineer, 27 Baltye St. (See Jan. 24 issue.)

Mar. 1.—Bridgwater T.C. Supply and installation of two electrically driven pumps. Borough Engineer, Town Hall. Deposit £2 2s.

Mar. 1.—Dundalk Y.D.C. Supply and installation of certain sewage pumping machinery, electric motors, switches, acces-

Your Queries — Answered

"Hotric" water heaters, makers of? L.L.—Geo. Pearson (Engineers) Ltd., 208 Chingford Mount Rd., E.4. (22016)

Steam whistles, remote push-button controlled, makers of? M.V. — Steven and Struthers, 4 Lloyds Avenue, E.C.3. (22023)

Uni-Tubes Ltd., makers of "Kopex" flexible tubing, address of? Y.E.—The address is 5 Urswick Rd., Homerton, E.9. (22027)

"Peton" insulating materials, makers of? A.W.—United Insulator Co. Ltd., Oakcroft Rd., Tolworth, Surbiton, Surrey. (22036)

"Latralok" fuse bridges, makers of? T.B.—Carlisle Electrical Mfg. Co. Ltd., Bentcliffe Works, Salters Lane, Eccles, Lancs. (22041)

"Solachrome" kettle elements, makers of? E.M.—F. J. Tomlinson Ltd., Hall Carr Mill, Rawtenstall, Rossendale, Lancaster. (22049)

[illegible]saw" sanding machines, [illegible]nts for? J.H.—British Equipment Co. Ltd., Ixworth House, Ixworth Place, S.W.3. (22056)

The above are selected from questions we have answered this week. If you have a query, send it to us.

sories, meter and ancillary equipment. J. A. Smyth, Town Clerk, Town Hall. Deposit £5 5s.

Mar. 1.—Irlam U.D.C. Supply of electric lamps wanted for year ending Mar. 31, 1953. Engineer and Surveyor, Council Offices.

Mar. 11.—East Riding. Installation of electrical services at Withernsea secondary school. Applications to County Architect, County Hall, Beverley. (See Jan. 24 issue.)

No date stated.—Kelso T.C. Electrical works in erection of 33 houses in Inchmyre site. Applications to J. Pennie, Town Clerk, Kelso.

OVERSEAS

Feb. 13.—Australia. Victorian Railways Commissioners invite tenders for supply of one diesel electric mobile crane complete with electrical equipment and accessories. B.o.T. (Ref. CRE 62/52)*.

Mar. 3.—Brazil. Tenders invited for construction and installation of a 20,000 kW thermo-electric plant at Candiota, and for machinery, equipment and engineering work connected with utilisation of coal mines to supply power for the electrification of railway system in State of Rio Grande do Sul. Senhor Jose Ramos de Oliva, Manager of the Administration Dept., Ministry of Transport and Public Works.

Mar. 6.—Australia. Supply of F.M. Duplex radio system to provide communication between Electricity Undertaking Control Room and fleet of 127 vehicles operating in and around Sydney. Tenders to General Manager, Sydney C.C., Queen Victoria Bldgs., George St., Sydney. B.o.T. (Ref. CRE (IB) 34/52).*

Apr. 22.—New Zealand. Supply of 600 miles of steel-cored aluminium transmission line conductor and accessories for Roxburgh Gorge power scheme. Stores Manager, State H.-E. Dept., Wellington.

June 10.—New Zealand. Sur of one 3,750 kVA 66/11·25 transformer bank for Motup., substation, Nelson, comprising three single-phase double-wound units each 1,250 kVA 66/6·5 kV, 50 c/s outdoor type, oil immersed and natural cooled. Contract No. 195. Deposit £100. Specifications from N.Z. Govt. Office in London.

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, "English" quality	176 10 0	
TIN (99·99·75%) (Cash)	999-1001	—
,, (3 months)	996-997½	—
ALUMINIUM, commercial purity (del.)	148 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Bowmac Electric Ltd. Liquidator, John M. Clarke, Official Receiver, Inveresk Hse., Strand, W.C.2, released as from Jan. 11.

Brightglow (Cardiff) Ltd. Last day for receiving proofs, Feb. 11. Liquidator is Torquil J. M. Macleod, 4 Bucklersbury, E.C.4.

C.M.C. (Switchmatic) Ltd. Creditors are asked to send particulars to liquidator, J. S. Bradley-Hole, of A. E. Orbell and Co., 7 Old Steine, Brighton, by Feb. 29.

Joyce Engineering Ltd. Last day for receiving proofs, Feb. 5. Liquidator is Torquil J. M. Macleod, 4 Bucklersbury, E.C.4.

Modern Neon Products. Partnership between Frank Brown and Kenneth Farnworth, trading as lighting engineers under above name at Guardian Bldg, Clare St., Blackpool, dissolved as from Dec. 1. Debts received and paid by F. Brown, who will continue business.

Roevac Metal Pressings Ltd. Meeting of creditors to be held at W. Alexander Walton and Co., 13-15 Lever St., Piccadilly, Manchester, on Feb. 7 at 11 a.m.

Voluntary Liquidation

Wellgale Electrical Co. Ltd., accumulator manufacturers. Statutory meeting of creditors held on Jan. 23, when approximate statement of affairs showed liabilities of £1,558. Assets estimated to produce £401, and after allowing £40 due to preferential creditor, net assets were £360, or deficiency as regarded creditors of £1,197. Resolution passed confirming voluntary liquidation with K. R. Cork, C.A., of W. H. Cork, Gully and Co., 19 Eastcheap, E.C.3, as liquidator, with committee of inspection.

BANKRUPTCY ACTS

Intended Dividends

Birkenhead. William B. Johnson, trading as Fluorescent Neon Display Co. at 114a Brighton St., Wallasey. Last day for receiving proofs, Feb. 12. Trustee is R. P. Booth, 5 Rumford Place, Chapel St., Liverpool.

Brighton. Reginald Davidson, electrical illuminating engineer trading at 199 High St., Lewes. Last day for receiving proofs, Feb. 8. Trustee is J. S. Bradley-Hole, of A. E. Orbell and Co., 7 Old Steine, Brighton.

Application for Discharge

London. William T. Norman and Cecil E. Turnham, lampshade manufacturers trading as Barblett and Willis at 271 Kings Rd., Chelsea, S.W.3. Hearing fixed for Feb. 28 at Bankruptcy Bldgs, Carey St., W.C.2.

TRADE NOTES

The Insuloid Manufacturing Co. Ltd. is shortly to open a new factory at Wythenshawe, Manchester, for the production of plastics, switchboard parts, etc., it is reported, to replace the factory destroyed by fire at Hulme two years ago.

The Pressed Steel Co. Ltd. is purchasing a factory site at Portsmouth for possible future expansion, it is reported. The company has recently opened a factory at Theale, Berks, for the manufacture of refrigerators.

British Driver-Harris Co. Ltd., have considerably extended and re-equipped their Fine Wire Section for the production of standard nickel chrome, copper nickel and pure nickel wire, in sizes down to 50s SWG.

Changes of Name. The name of the International Time Recording Co. Ltd. has been changed to I.B.M. United Kingdom Ltd.

The title of Hillman Electrical Ltd. has been altered to Hillman Electric Motors Ltd.

BUSINESS PROSPECTS

HOME

Bathavon R.D.C. Construction of 100 dwellings at Peasdown. Council's Architect, W. A. Williams, 5 Mount Street, Bath.

Bingley U.D.C. Erection of 32 houses and 8 flats on Coltingley site. J. S. Lattin, Surveyor and Architect, Town Hall.

Blyth (Suffolk) R.D.C. Twenty-six houses to be built on five sites.

Bradford. City Council recommended to apply for sanction to borrow £1,360 and £590 for electrical installation at Lapage St. and Sandy La. schools resp.

Bridgwater T.C. Tenders to be invited for erection of 24 flats and 14 houses as extension to Sydenham estate.

Brighton T.C. Erection of secondary school at Varndean. Borough Engineer and Surveyor, 26-30 King's Rd.

Brixham U.D.C. Erection of 40 houses on Penn Valley estate. Architects, W. G. Couldrey and Son, 14 Palace Ave., Paignton.

Bude-Stratton (Corn.) U.D.C. Erection of 24 dwellings on Berries Ave. estate. Surveyor's Office, The Castle, Bude.

Burgess Hill U.D.C. Erection of 18 houses and six flats on St. Andrew's Rd. site. F. E. R. Hogg, Engineer and Surveyor, Council Offices, 32 Church Rd.

Carmarthenshire. Erection of first instalment of technical and county college at Ammanford. W. T. Lloyd, County Architect, County Hall, Carmarthen.

Carrickfergus T.C. Application to be made for sanction to borrow £100,000 for erection of 100 cottages at Eden.

Cheltenham T.C. Site preparations to begin soon for 31 houses on Knapp estate, Charlton Kings.

Crayford (Kent) U.D.C. Ten shops and flats and eight bungalows to be built in Plantation Rd. Also 241 houses to be built in Northend Rd., 15 in Bourne Rd., and eight in Oak Rd.

Crewe T.C. Approval granted for construction of 140 houses on Westaston Green estate.

Dagenham T.C. Erection of 42 flats in Dagenham Rd. Borough Engineer and Surveyor, Civic Centre.

Darlington T.C. Layout approved of 90 houses on Haughton South site.

Durham. Scheme to proceed in erection of technical colleges in Durham and at Easington, and infants' school at Peterlee.

Ealing T.C. It is expected that contractors will be shortly invited to submit names for inclusion in selected list in connection with development of Northolt Park estate.

Ellesmere (Salop). Construction of 34 houses on four sites. E. G. D. Healey, clerk, Trimpley Hall.

Esher U.D.C. Construction of 34 dwellings at Claygate and 64 at Stoke D'Abernon. Engineer and Surveyor, Council Offices.

Halstead U.D.C. Housing scheme being prepared for Nether Priors.

Longford. Erection of technical school at Granard. Quantity surveyor is T. C. Whelan, National Bank Chambers, 1 and 2 Cavendish Row, Dublin.

Luton T.C. Plans approved for rebuilding part of Lye and Sons Ltd.'s factory in New Bedford Rd. Also, tenders to be invited shortly for erection of 60 houses on Ramridge estate.

Newton Aycliffe. Development Corp. is expected to spend about a million pounds this year on erection of 643 houses and site works for further 840 houses. Corporation's chief architect is G. H. Goldstraw.

North Shields. De La Rue and Co. Ltd. are to extend their factory on the West Chirton trading estate.

Port Glasgow T.C. It is proposed to build about 400 houses on Park Farm site.

Slough T.C. Erection of 23 blocks of flats on Priory estate. Borough Engineer, Town Hall.

South Shields T.C. Erection of a five-storey block of flats in Lawe Rd. Borough Engineer, Town Hall.

Stretford. Consideration to be given to erection of about 70 flats at Gorse Hill.

Totnes T.C. Approval granted for erection of 46 houses on Pathfields site.

Tottenham. Erection of Belmont junior school has been proposed.

Wallsend T.C. Site to be allocated on Low Willington Farm estate for construction of R.C. church.

West Riding. Erection of Rothwell, Garforth, Pudsey Waterloo and Featherstone Purston schools. County Architect, "Bishopgarth," Westfield Rd., Wakefield.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

Allied Electrical Services (Leeds) Ltd., 69 Low Rd., Hunslet, Leeds 10. Manufacturing, selling, charging and recharging electrical batteries, etc. Cap.: £3,000. Dirs.: A. S. Hossack, J. H. Hargrave, P. H. Morrell, A. E. Hickman and A. Hickman.

A.R.D. Ltd., Prudential Bldgs., 99 Mount Pleasant Rd., Tunbridge Wells, Kent. Manufacturers of and dealers in domestic and commercial refrigerators, cabinets, coldrooms, etc. Cap.: £10,000. Dirs.: D. P. Toomey, J. H. P. Dalton, E. A. J. Soulby and A. J. Day.

Armitage Services (Staffordshire) Ltd., Old Road Armitage, nr. Rugeley, Staffs. Motor, mechanical, electrical and general engineers, etc. Cap.: £2,000. Dirs.: C. K. Stott, A. E. Stott and K. Campbell.

Coin Insulation Ltd., 127a Courtney Rd., Woking, Surrey. Manufacturers of and dealers in sheeting and other components and fabrications, laminated bakelite, etc., for use in mechanical and electrical application, etc. Cap.: £1,000. Dirs.: R. C. Cooke and Mrs. E. D. Cooke.

Davey and Zwicky Ltd., Kings Bldgs., Avenue Rd., Freshwater, I.W. To acquire goodwill of business of radio, television and general electrical suppliers carried on as "Davey and Zwicky" at Freshwater, I.W. Cap.: £1,500. Dirs.: E. W. Davey, P. M. Zwicky and H. L. Gray.

Delaney Distributors, Ltd., 11 Fountain St., Halifax. Wholesalers and retailers of electrical components, including radio and television sets, etc. Cap.: £100. Dirs.: to be appointed by subs. Subs.: M. C. Dixon and Joyce Crossley.

Eastric Ltd., Centaur Works, Tylers Ave., Southend-on-Sea. Manufacturers to industry of electrical and mechanical components and accessories and manufacturers of plastics. Cap.: £2,500. Dirs.: P. W. Deer, K. P. Sowter and R. C. Fincher.

MEETINGS TO NOTE

THURSDAY, JAN. 31

I.E.E. (Rugby sub-centre).—The Rugby Engineers' Ball at Co-operative Hall.

I.E.S. (Exeter Group).—"Lighting of New House of Commons." C. Dykes Brown. Providence Hall, Northernhay St., 7 p.m.

I.E.E. (S. Midland Centre).—Discussion on "Laboratory Work for Electrical Machines." A. Draper. James Watt Memorial Inst., Birmingham, 6 p.m.

A.S.E.E. (Luton Branch).—"A Camera and the Engineer." G. E. Whalley. George Hotel, 8 p.m.

A.M.E.M.E. (Lothians Branch).—"Refinery Electrification." F. N. Beaumont and G. A. McLennon.

FRIDAY, FEB. 1

I.E.S. (Bath and Bristol Centre).—"Lighting of New House of Commons." C. Dykes Brown. S.W. Elect. Board, Colston Ave., Bristol, 6.15 p.m.

I.E.S. (Huddersfield Group).—"Fine Detail." A. G. Smith. Elect. Showroom, Market St., 7.15 p.m.

INSTN. OF MECH. ENGRS.—"Powered Flying Controls: Design." F. J. Bradbury and S. M. Parker. Storey's Gate, S.W.1, 5.30 p.m.

I.E.E. (S. Midland Centre).—Annual dinner at Grand Hotel, Birmingham.

MONDAY, FEB. 4

SOC. OF ENGINEERS.—Presidential address by R. S. V. Barber. Geological Soc., Burlington Hse., W.1, 5.30 p.m.

INSTN. OF ENGRING. INSPECTION (Coventry Branch). — "Industrial Lighting." E. F. G. Beeson. Technical College, 7.30 p.m.

I.E.E. (London Students Section).—"Electromagnetism and Engineering Research." K. J. R. Wilkinson. Savoy Place, W.C.2, 7 p.m.

I.E.E. (Mersey and N. Wales Centre).—"Economics of Low-Voltage Electricity Supplies to New Housing Estates." F. G. Copland. Town Hall, Chester, 6.30 p.m.

I.E.E. (N.E. Radio and Measurements Group).—"Investigation into Mechanism of Magnetic-Tape Recording." P. E. Axon. King's College, Newcastle, 6.15 p.m.

I.E.E. (N. Staffs sub-centre).—"Rationalised M.K.S. Units in Electrical Education." King Edward VI School, Stafford, 7 p.m.

I.E.E. (Ipswich).—"Modern Developments in Electric Welding." H. G. Taylor. Crown and Anchor Hotel, 6.30 p.m.

I.E.E. (Maidstone). — "Electrophonic Organ." L. E. A. Bourn. New Inn, Sandling Rd., 7.30 p.m.

I.E.E. (Norwich). — "Phase/Neutral System of Supply for Rural H.V. Distribution." G. T. Garwood and G. J. Websdale. Royal Hotel, 7.30 p.m.

A.S.E.E. (Leeds Branch).—"Textile Electrification." R. Spence. Gt. Northern Hotel, 7.30 p.m.

A.S.E.E. (N.E. London Branch).—"High Rupturing Capacity Fuse and Its Scope." R. Crinson. Angel Hotel, Ilford, 8 p.m.

A.S.E.E. (Sheffield Branch).—"Electronics in Industry." Mr. MacDonald. Royal Victoria Station Hotel, 7.30 p.m.

TUESDAY, FEB. 5

I.E.S. (Liverpool Centre). "Lighting of an Ocean Terminal." H. S. Allpress. Service Centre, Whitechapel, 6 p.m.

I.E.S. (Stoke-on-Trent Group).—"Lighting of Architecture." G. Grenfell Baines. 31 Kingsway, 6 p.m.

I.E.E. (Cambridge Radio Group).—"Colour Television." L. C. Jesby. Cambridgeshire Tech. College, 6 p.m.

I.E.E. (N. Midland Centre).—"Protection of Electrical Power Systems—Critical Review of Present-Day Practice and Recent Progress." H. Leyburn and C. H. W. Lackey. 1 Whitehall Rd., Leeds, 6.30 p.m.

I.E.E. (N.W. Centre).—"Economic Plant Sizes and Boiler Set Groupings on British Grid." B. Donkin and P. H. Margen. Engineers' Club, Albert Sq., Manchester, 6.15 p.m.

A.S.E.E. (W. London Branch).—"Electrical Oils." E. C. Montgomery. Windsor Castle Hotel, King St., Hammersmith, 7.30 p.m.

WEDNESDAY, FEB. 6

I.E.S. (Newcastle Centre). — "Illumination and Illusion." P. Hartill. Minor Durrant Hall, Oxford St., 6.15 p.m.

I.E.E. (Tees-side sub-centre).—"Electrical Control of Dangerous Machinery and Processes: Pt. 3, Remote Supervisory Control." W. Fordham Cooper. Cleveland Scientific and Tech. Inst., Corporation Rd., Middlesbrough, 6.30 p.m.

I.E.E. (Southern Centre).—"New Power Stroboscope for High-Speed Flash Photography." W. D. Chesterman, D. R. Clegg, G. T. Peek and A. J. Meadowcroft. Royal Beach Hotel, Portsmouth, 6.30 p.m.

A.S.E.E. (N. London Branch).—"Supervisory Remote Control of Electrical Supplies." J. F. Fletcher. Three Jolly Butchers Hotel, Wood Green, 8.15 p.m.

A.S.E.E. (York Branch).—"Electrical Measuring Instruments and Industrial Metering." J. Collinge. Creamery Restaurant, Pavement, 7.30 p.m.

THURSDAY, FEB. 7

BRITISH INSTN. OF RADIO ENGRS. (Scottish Section).—"Some Special Oscillograph Techniques." Prof. F. M. Bruce. Royal Tech. College, Glasgow, 7 p.m.

WORCESTER ELECTRIC CLUB.—"Stage Lighting." E. E. Faraday. To be held at Archdales.

I.E.S. (Nottingham Centre).—"Illumination of a Medium Size Factory." W. K. Martin. E. Midlands Elect. Board, Smithy Row, 5.30 p.m.

I.E.E. (London).—"Economics of Low-Voltage Electricity Supplies to New Housing Estates." F. G. Copland. Savoy Place, 5.30 p.m.

A.S.E.E. (S. London Branch).—"General Installation Work in Large Blocks of Flats." J. W. Quelch, Cafe Royal, Croydon, 8 p.m.

FRIDAY, FEB. 8

JNR. INSTN. OF ENGINEERS.—"Modern Submarine Cables." E. A. Applebee. 39 Victoria St., S.W.1, 6.30 p.m.

E.P.E.A.(N.Meter and Instruments Tech. Group).—"Current and Voltage Transformer Testing and Remote Metering or Indication." G. F. Shotter. Y.E.B., Whitehall Rd., Leeds, 6.30 p.m.

MANCHESTER ASSOC. OF ENGRS.—Annual lecture. College of Technology. Prof. F. C. Williams.

I.E.S. (Birmingham Centre).—"Industrial Lighting." E. H. Norgrove. Imperial Hotel, 6 p.m.

I.E.E. (N.E. Centre).—Annual dinner at Old Assembly Rooms, Newcastle, 7.15 p.m.

A.S.E.E. (Bristol Branch).—"Automobile Welding Repairs." A. Gilliard. Grand Hotel, 7.30 p.m.

A.S.E.E. (Crewe Branch).—"Industrial Lighting." V. Heydon. Copeland Arms Hotel, Glebe St., Stoke, 7.30 p.m.

A.S.E.E. (Liverpool Branch).—"Distinguished Company." Service Centre, Whitechapel, 7.30 p.m.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Ventex. 702,224. Class 9. Loud speakers mounted in cabinets. C. T. Chapman (Reproducers) Ltd., Allendale Works, Worsley Bridge Rd., S.E.26.

Statistrol. 702,967. Class 9. Electric control apparatus, etc. Sargrove Electronics Ltd., The Industrial Research Laboratories, Alexandra Rd., Hounslow, Middx.

Jubilee. 695,802. Class 9. Radio and television receiving apparatus. E. K. Cole Ltd., Ekco Works, Southend-on-Sea.

Elpico. B701,737. Class 9. Wireless and television instruments, etc. Lee Products (G.B.) Ltd., 90 Gt. Eastern St., E.C.2.

Hawk. B700,887. Class 11. Pocket electric lamps, pocket torches, etc. Hawk Ltd., Treforest Trading Estate, Pontypridd.

Cutler-Hammer. 661,665. Class 9. Motor starters, lifting and separating magnets, switches, rheostats, relays, contactors, etc. Cutler-Hammer Inc., 315, North 12th St., Milwaukee, Wisconsin, U.S.A.

Cartridge Fuse-links

PLEASE WRITE FOR CATALOGUE 30

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON E.C.1

WESTON

Electrical Measuring Instruments

No. 4 . . . 6″ Scale Switchboard Instruments

Weston 6″ scale switchboard instruments combine the sensitivity of a laboratory instrument with the robust qualities necessary in a switchboard pattern. The range includes the Model S.57, which is supplied as a D.C. Microammeter, Milliammeter, Ammeter or Voltmeter: The S.58 which incorporates a thermocouple for the measurement of H.F. currents and is available as a Milliammeter or Ammeter: The Model S.59, incorporating a metal rectifier for the measurement of A.C., is supplied as a Milliammeter or Voltmeter and the Model S.60 is a Moving Iron Instrument for A.C. or D.C. measurement and is available as a Milliammeter, Ammeter or Voltmeter. The illustration shows the Model S.60 in the projecting type case. All models are available in either projecting or flush type moulded Bakelite cases. Further information and full details of the ranges supplied available on request.

SANGAMO WESTON LIMITED

Enfield, Middlesex. Tel: Enfield 3434 (6 lines) & 1242 (4 lines). Grams: Sanwest, Enfield

Branches: Glasgow, Manchester, Newcastle-on-Tyne, Leeds, Liverpool, Wolverhampton, Nottingham, Bristol, Southampton & Brighton

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED - FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF BURY ST. EDMUNDS

MAINTENANCE OF ELECTRICAL EQUIPMENT AND INSTALLATIONS

TENDERS are invited for the INSPECTION AND MAINTENANCE of electrical equipment and electrical installations in Council Houses on the Mildenhall Road Estate.

Tenders should include for an annual inspection of the electrical installations, and should be at a rate "per house," in order that houses handed over in the future may be included. The total number of houses at present occupied on the estate is 492. They should also include for six monthly inspections of electrical equipment as per lists which may be inspected in the Borough Engineer's Office; (216 houses are at present affected), and should allow for the replacement of defective parts (to be charged at current rates), all other charges to be included within the tender price again "per house."

The Council do not bind themselves to accept the lowest or any tender.

Tenders should be delivered in a sealed envelope endorsed "Maintenance of electrical equipment," to the Borough Engineer and Surveyor, Borough Offices, Angel Hill, Bury St. Edmunds, not later than 12 noon, Monday, February 18, 1952.

NORMAN C. GOLDSMITH, M.B.E., M.I.Mun.E.,
Borough Engineer and Surveyor.

Borough Offices, Bury St. Edmunds.
January 23, 1952. (P 799)

CITY OF MANCHESTER

THE Education Committee invite tenders for the ELECTRICAL INSTALLATION at "Barfield" and "Southernhey," Spath Road and Mersey Road, West Didsbury, Manchester 20.

Specification and drawing may be obtained at the office of the City Architect, Town Hall, upon payment of £1 1s., which sum will be returned upon receipt of bona-fide tender. All cheques and postal orders are to be made payable to the order of "The Corporation of Manchester," and crossed.

Sealed tenders, enclosed in the official envelope to be delivered to the Education Offices, Deansgate, Manchester 3, not later than 10 a.m. on February 18, 1952.

The Corporation do not bind themselves to accept the lowest or any tender.

PHILIP B. DINGLE,
Town Clerk.

Town Hall, Manchester.
January, 1952. (P 797)

PARISH COUNCIL OF TOWCESTER

STREET LIGHTING

TENDERS are invited for the supply, erection and installation of 28 Fluorescent Street Lighting Units (3 x 80 W) to Group A standard on Trunk Road A5 in the Parish of Towcester.

Application for specifications, maps, bills of quantities and forms of tender to be made to the undersigned and to be returned in sealed envelope by noon on Tuesday, February 26, 1952.

The Council does not bind itself to accept the lowest or any tender.

A. E. G. KEMSLEY,
Clerk of the Towcester Parish Council.

5 Burcote Way,
Towcester, Northants. (P 803)

APPOINTMENTS VACANT

SOUTH EASTERN ELECTRICITY BOARD

CARTOGRAPHIC DRAUGHTSMAN, Tunbridge Wells district.

Salary £440 by £20 to £500 p.a. under N.J.C. Agreement, Grade 2. Superannuation will be arranged. Applicants should have had experience in the preparation of network diagrams, mains and service records and production of plans for mains extensions, etc., also experience of general drawing office routine.

Application forms, obtainable from T. W. Dann, M.Eng., M.I.E.E., District Manager, SEEBoard, Town Hall, Tunbridge Wells, to be returned by February 11, 1952.

PRINCIPAL ASSISTANT, Secretary's Department, Headquarters.

Salary £755 by £30 to £845 under N.J.C. Agreement, Grade 7. Superannuation will be arranged. The successful applicant will be engaged primarily on duties involving the co-ordination of education and training and apprenticeship schemes for technical, administrative and clerical staffs, and manual workers. Experience in the field of education and training is desirable as well as possession of a degree or professional qualification.

Applications, giving two referees, must reach A. L. Burnell, F.I.M.T.A., A.A.C.C.A., Secretary, SEEBoard, 10 Queen's Gardens, Hove 3, Sussex, by February 13, 1952.

A. L. BURNELL,
Secretary.

January, 1952. (P 817)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Dumfries and Galloway Sub-Area

APPOINTMENT OF FIRST ASSISTANT DISTRICT ENGINEER, WIGTOWN DISTRICT

APPLICATIONS are invited for the post of First Assistant District Engineer in the Wigtown district, based at Stranraer.

Applicants should be graduates of the Institution of Electrical Engineers or hold equivalent qualifications, and they should have a sound technical training and be experienced in the planning, construction, operation and maintenance of overhead and underground mains and sub-stations up to 33 kV.

The post is superannuable and the salary will be in accordance with Schedule A, Class "C," Grade 4 (£699-£713 p.a.), of the National Joint Board Agreement.

Applications, stating age, experience, education and training, together with the names of two referees, should be sent to the undersigned not later than February 14, 1952.

W. H. WILLS,
Manager.

Marchmount, Dumfries.
January 23, 1952. (P 791)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

FIRST ASSISTANT CONTROL ENGINEER required in System Operation Department, Divisional Headquarters, Birmingham. National Joint Board service conditions, superannuable appointment, commencing salary in accordance with Schedule C, Grade 5 (£629 to £765, ultimately rising to £858).

Higher National Certificate in electrical engineering or equivalent qualification required, together with sound practical training in connection with system operation and control. Generating station experience an advantage.

Application forms obtainable from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by February 16, 1952.

F. W. LAWTON,
Divisional Controller.

(P 789)

BOROUGH OF WILLESDEN

Borough Engineer and Surveyor's Department

APPOINTMENT OF CHIEF MECHANICAL AND ELECTRICAL ENGINEERING ASSISTANT

APPLICATIONS are invited for the appointment of Chief Mechanical and Electrical Engineering Assistant on the permanent staff of the Borough Engineer and Surveyor's Department. The salary attaching to the post will be within grades A.P.T. VII/VIII, namely, £715 to £840 per annum inclusive of London Weighting, the commencing salary being in accordance with the successful candidate's qualifications and experience.

Candidates must have passed one of the following examinations, namely:

1. The Associate Membership Examination of the Institution of Mechanical Engineers.
2. The Associate Membership Examination of the Institution of Electrical Engineers.
3. A British University Degree or Diploma in Mechanical or Electrical Engineering

and it will be deemed an additional qualification if any candidate holds the Higher National Certificate in Mechanical Engineering or Electrical Engineering, or has passed the Final Examination of the Institution of Heating and Ventilating Engineers.

Candidates should have some training and practical experience in mechanical engineering, particularly in the repair and maintenance of mechanical installations and electrical plant.

The successful candidate will be expected to take charge of the Mechanical and Electrical Sub-section of the Borough Engineer's Department. Full details of the staff employed in and the duties carried out by the Sub-section will be forwarded on application to the undersigned.

The foregoing appointment will be terminable by one month's notice on either side, is subject to the provisions of the Local Government Superannuation Act, 1937, and the successful candidate will be required to pass a medical examination.

It will be necessary for the successful candidate to provide his own housing accommodation as the Council is not in a position to assist.

Applications, stating age, qualifications, experience, etc., accompanied by copies of not more than three testimonials, should be addressed to the undersigned, endorsed "Engineering Appointment," not later than 10 a.m. on Monday, February 25, 1952.

Canvassing, either directly or indirectly, will be deemed a disqualification.

R. S. FORSTER,
Town Clerk.

Town Hall, Dyne Road,
Kilburn, N.W.6.
January 23, 1952. (P 808)

CROWN AGENTS FOR THE COLONIES

INSTALLATION SUPERINTENDENT required by the Government of Sierra Leone for the Electricity Branch of the Public Works Department for one tour of 18 to 24 months with prospect of permanency. Salary according to qualifications and experience in the scale £660 a year rising to £970 a year (including expatriation pay). In addition, a temporary allowance of 12½ per cent. of basic salary is at present payable. Outfit allowance £60. Free passages. Liberal leave on full salary. Candidates should have served an apprenticeship in the consumers' section of an electricity undertaking and should possess an Ordinary or Higher National Certificate in Electrical Engineering. Experience in the installation of power and lighting circuits to comply with the Institution of Electrical Engineers' regulations is essential. Some experience in the testing of single-phase kilowatt hour meters is important.

Apply at once by letter, stating age, full names in block letters, and full particulars of qualifications and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.28555.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 818)

SOUTH WESTERN ELECTRICITY BOARD

Devon Sub-Area Headquarters

SECOND ASSISTANT ENGINEER

COMMENCING salary £747 per annum, in accordance with Class "H", Grade 7 of the N.J.B. Agreement.

The successful candidate will be responsible for the planning of the system in the Sub-Area, including wayleaves and consents and the preparation of capital sanction applications; the design, standardisation and inspection of construction work involving liaison with contractors and statutory applications procedure. Responsibilities will also cover the testing of equipment, preparation of maintenance schedules and Civil Defence.

Applications to Sub-Area Manager, South Western Electricity Board, 57 Paul Street, Exeter, within 10 days. (P 804)

DENBIGHSHIRE COUNTY COUNCIL

County Architect's Department (Wrexham)

APPLICATIONS are invited for the following appointment on the permanent staff.

ASSISTANT ELECTRICAL ENGINEER. A.P.T. Grade 5. Salary: £570 to £620 per annum.

Candidates should be corporate members of the Institution of Electrical Engineers, possessing adequate technical knowledge and practical experience in the design of installations, including preparation of plans and specifications and the supervision of contracts in connection with electric lighting, heating and power plants in municipal buildings, including schools and institutions.

The appointment is subject to (*a*) the National Conditions of Service for Local Government Administrative, etc., Officers; (*b*) the Local Government Superannuation Act, 1937; (*c*) the passing of a medical examination, and (*d*) one calendar month's written notice on either side to expire at the end of a calendar month.

Applications, giving age, qualifications and particulars of present and previous appointments and accompanied by copies of three recent testimonials, to be sent to the undersigned, by not later than February 15, 1952.

W. E. BUFTON,
Clerk of the County Council.

County Offices, Ruthin.
January, 1952. (P 787)

MIDLANDS ELECTRICITY BOARD

North Staffordshire Sub-Area

APPOINTMENT OF DISTRICT ENGINEER

APPLICATIONS are invited for the position of District Engineer in the Stoke South West District of the North Staffordshire Sub-Area.

Applicants should be corporate members of the Institution of Electrical Engineers or hold equivalent qualifications and must have had extensive experience in the operation and maintenance of high and medium voltage distribution networks and associated switchgear, transformers and protective systems.

The appointment will be in accordance with the National Joint Board conditions, the salary being Class "E", Grade 3 £833 to £868 per annum.

Applications, stating age, present position and salary, and giving full details of experience and qualifications, endorsed "District Engineer" should be forwarded within 14 days to Mr. H. A. P. Caddell, Manager, North Staffordshire Sub-Area, 31 Kingsway, Stoke-on-Trent.

A. STEPHENS
Secretary.

January 18, 1952. (P 772)

CROWN AGENTS FOR THE COLONIES

INSTRUCTOR (GENERAL ELECTRICAL ENGINEERING) required by the Mombasa Institute of Muslim Education, Kenya, for a tour of three years in the first instance with prospect of further employment by mutual agreement. Commencing salary according to age, qualifications and experience in scale £550 rising to £815 a year. Cost of living allowance approximately £90 to £100 a year. Outfit allowance £30. Contributory superannuation scheme. Free passages and free furnished accommodation. Liberal leave on full salary. Candidates should have served an appropriate apprenticeship and have had wide subsequent practical experience in their trade, including outside wireman's work. They must be capable of instructing in all branches of their trade, both in theory and in practice, and should hold a City and Guilds Certificate or equivalent qualification.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications, and experience, and mentioning this paper, to the Crown Agents for the Colonies, 4 Millbank, London S.W.1, quoting on letter M.28943.B. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (P 809)

BRITISH ELECTRICITY AUTHORITY

South Wales Division

APPLICATIONS are invited for the superannuable appointment of DEPUTY POWER STATION SUPERINTENDENT at Upper Boat Power Station at a salary in accordance with N.J.B., Class "H," Grade 3 (£1,010-£1,057 per annum).

Applicants should preferably be Corporate Members of the Institution of Mechanical or Electrical Engineers and should have had wide experience in the operation, maintenance and administration of a power station with modern generating plant.

Application forms, obtainable from the Divisional Secretary at the address below, should be returned by February 12, 1952.

H. J. BENNETT,
Divisional Controller.

British Electricity Authority,
Cardiff (Pengam Moors) Airport,
Cardiff.
January 21, 1952. (P 806)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following position:—

8/52 JUNIOR ENGINEER, Telecommunications Section, Regional Technical Group.

Applicants should have qualifications to H.N.C. standard, together with experience in automatic telephone type circuits and V.F. signalling as employed in remote and supervisory control systems, P.A.X., etc. Experience of power line carrier technique will be an added advantage.

The selected candidate will be required to live in the Coventry or Leicester districts.

The salary for the above appointment will be in accordance with Grade 9, AX/DX, of the N.J.B. Agreement, commencing at £375 per annum and the position will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than February 18, 1952.

L. F. JEFFREY,
Divisional Controller.

January 25, 1952. (P 812)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited from suitably qualified persons for the following position:—

7/52 1ST ASSISTANT CHEMIST, STAYTHORPE

Candidates should preferably possess the Higher National Certificate in Chemistry or its equivalent, and should have had practical experience in the analysis of coal, water and oil, etc., in so far as they concern Power Stations.

The salary for the above appointment will be in accordance with Grade 9, Class "J" (£699 to £728 p.a.) of the N.J.B. Agreement, and the position will be superannuable within the terms and conditions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, Barker Gate, Nottingham, and should be returned not later than February 11, 1952.

L. F. JEFFREY,
Divisional Controller.

January 18, 1952. (P 743)

SOUTHERN ELECTRICITY BOARD

APPLICATIONS are invited for the following post:—

FIRST ASSISTANT DISTRICT ENGINEER (maintenance and operation), Bournemouth District of No. 4 (Bournemouth) Sub-Area. Salary in accordance with N.J.B., Class "G," Grade 5, Column 1 (£806 per annum). N.J.B. conditions of service.

Candidates must have had wide experience with all types of distribution and substation equipment up to and including 33 kV, and be capable of undertaking all forms of tests. Sound technical training up to Higher National Certificate standard is essential, and they should preferably be Corporate Members of the Institution of Electrical Engineers.

The successful candidate will, if eligible, be required to contribute to the B.E.A. and Area Boards' Superannuation Scheme.

Applications, on forms obtainable from the Sub-Area Secretary, and returned to him in envelopes suitably endorsed, at No. 1 Priory Road, Bournemouth, not later than February 11, 1952.

F. W. KEMPTON,
Secretary.

January 31, 1952. (P 805)

LONDON ELECTRICITY BOARD

INSTALLATION SUPERVISOR

APPLICATIONS are invited for the above position at Dartford, Kent.

Candidates should possess sound technical knowledge and be experienced in all types of wiring installations and consumers' apparatus. The successful applicant will be required to prepare specifications, estimates and tenders for all classes of electrical installations, and to supervise contracting work in progress.

Pending grading of the post under the National agreement of the appropriate negotiating body, the provisional salary will be fixed according to qualifications and experience, up to a maximum of £590 per annum inclusive.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned completed by February 11, 1952. Please enclose addressed envelope and quote ref. V/1395/T on all correspondence. (P 811)

HIS MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following posts:—

CHIEF BROADCASTING ENGINEER (27323/29), GOLD COAST. To be responsible for the Broadcasting Engineering Section of the Public Relations Department. Appointment will be either on the pensionable establishment with salary at rate of £1,100 a year, with an expatriation allowance of £350 a year, or on contract for one tour of service in the first instance at £1,300, plus £400 expatriation allowance. A temporary cost-of-living allowance of 15% on basic salary is payable. Free passages once each way each tour will be granted to the officer, his wife and children under nine years up to three in number, subject to the children residing in the Colony for a minimum of six months each tour. Quarters if available are provided at reasonable rent and leave is granted at rate of one week for each month of service in a tour of 18 months.

Candidates must be corporate members of the Institution of Electrical Engineers with appropriate experience in radio engineering. They must have had extensive experience in the organisation, production and engineering of broadcasting programmes and of administration in a large broadcasting organisation. They should have a thorough knowledge of the design, layout, maintenance and operation of: (*i*) wire broadcasting systems; (*ii*) medium-size broadcasting transmitters; (*iii*) modern studio equipment including tape and disc recording.

ENGINEERS, POSTS AND TELEGRAPHS DEPARTMENT (27323/2) NIGERIA. Vacancies exist for Engineers in the Posts and Telegraphs Department, Nigeria. Appointment will either be on three years' probation for pensionable employment in the salary scale £720 to £1,300 or on contract at somewhat higher rates, the point of entry being determined by war service and approved experience. A temporary cost-of-living allowance of from £57 to £100 is payable.

Free passages are granted for the officer and his wife, and assistance of up to £75 for a maximum of two children is granted in respect of their passages or maintenance in the United Kingdom. Furnished quarters, if available, are provided at a rent of £60 to £90 a year. Leave is granted at the rate of one week for each month of resident service in a tour of 18 to 24 months.

Candidates, between the ages of 25 and 35, must be at least graduates of the Institution of Electrical Engineers or have a university degree in electrical engineering, preferably telecommunications, or be assistant engineers in the British Post Office, and have had experience of carrier and V.F. telegraph circuits, and V.H.F. multichannel equipment.

Intending candidates should apply in writing to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of their age, qualifications, and experience. They should mention this paper and quote the reference number shown against the post for which application is made. (P 773)

LONDON ELECTRICITY BOARD

ENGINEERING DRAUGHTSMAN
DRAUGHTSMAN

APPLICATIONS are invited for the following positions in the North Western Sub-Area at Aybrook St., W.1.

1. Engineering Draughtsman. Candidates should have had a good general and technical education in building construction and architecture, and experience in the design of small buildings in brickwork and reinforced concrete would be an advantage.

The post is graded under Schedule "D" of the National Joint Board Agreement as Grade 6: £438 to £574 7s. per annum, inclusive of London Allowance, and the commencing salary will be dependent upon qualifications and experience.

2. Draughtsman. Candidates should be experienced in the following in relation to distribution systems up to 11 kV: (*a*) plant and cable layout work; (*b*) diagrams, and (*c*) cable surveys and wayleaves.

The post is graded within the National Joint Council Agreement (General Clerical Grade), and the commencing salary would be determined according to age and qualifications up to a maximum of £460 per annum inclusive.

Applications on forms obtainable from Establishments Officer, 46 New Broad St., E.C.2, to be returned by February 11, 1952, stating clearly the particular vacancy for which the application is made. Please enclose addressed foolscap envelope and quote Ref. 1382/316/T, on all correspondence. (P 788)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for ASSISTANT WAYLEAVE OFFICER.

Candidates should be aged 26-30 and should have an agricultural background. A knowledge of land agency or similar work will be an advantage, and training will be given in wayleaving and estate management.

Salary, N.J.C. Grade 1 (£360-£450).

Application forms, which are obtainable from P. D. A. Oliver, Divisional Secretary, 111 High Street, Portsmouth, must be returned by February 11, 1952. (P 813)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 1 (Bradford) Sub-Area

GENERAL ASSISTANT DISTRICT ENGINEER (Bradford)—Two posts (Vacancy No. 167/51)

Applicants should:—

(a) Have passed the Graduateship Examination of the Institution of Electrical Engineers or hold equivalent qualifications;
(b) have experience in construction, operation and maintenance of high voltage systems, underground cables, overhead lines and substations, and medium and low voltage networks;
(c) be prepared to reside within the District and undertake standby duties if required.

Salary, N.J.B. Agreement, Class "H," Grade 11, £587 to £607 per annum.

Applications, stating the above vacancy number, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, within fourteen days of the appearance of this advertisement.

No. 6 (Hull) Sub-Area

SALES SPECIALIST ENGINEER (Hull District) (Vacancy No. 172/51)

Applicants should have had a wide practical experience of electrical installation work in commercial, domestic and industrial premises. They must be competent to advise consumers in particular on lighting installations.

Preference will be given to candidates who are members of the Institution of Electrical Engineers or who hold equivalent qualifications.

Salary, N.J.B. Agreement, Class "H," Grade 8, £697 to £726 per annum.

GENERAL ASSISTANT ENGINEER (Hull) (Vacancy No. 14/52)

Applicants must hold the Higher National Certificate or equivalent qualification and have experience in the repairing and testing of all classes of meters and instruments, together with their installation and maintenance. Some knowledge of protection gear will be an advantage.

Salary, N.J.B. Agreement, Class "J," Grade 13, £532 to £553 per annum.

GENERAL ASSISTANT DISTRICT ENGINEER (Goole) (Vacancy No. 15/52)

Applicants should have had experience in the operation and construction of 11 kV and l.t. overhead lines, including pole-mounted substations for rural electrification. They should also be competent to carry out overhead line surveys, preparation of route plans, supervision of linesmen and erection of overhead lines. Knowledge of underground networks will be an advantage.

Preference will be given to Corporate Members of the Institution of Electrical Engineers, or holders of the Higher National Certificate.

The successful candidate will be required to reside in Selby and carry out standby duties.

Salary, N.J.B. Agreement, Class "D," Grade 11, £480 to £497 per annum.

Applications, stating the above vacancy numbers, and giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, within fourteen days of the appearance of this advertisement. (P 807)

BRITISH ELECTRICITY AUTHORITY

Merseyside & North Wales Division

SHIFT CHARGE ENGINEER required at St. Helens Power Station. Commencing salary N.J.B. E/7 £629. Superannuable and subject to medical examination. Good general and technical education with experience in operation of generating plant essential. Higher National Certificate desirable. Forms from Divisional Secretary, Clarke Gardens, Woolton, Liverpool. Closing date February 15, 1952. (P 810)

NORTH WESTERN ELECTRICITY BOARD

No. 4 Sub-Area

APPOINTMENT OF LINESMEN (OVERHEAD POWER)

APPLICATIONS are invited for posts of Linesmen (Overhead Power) in the 4B—Lune District based on Lancaster, and the 4C—North West Fylde District based on Fleetwood, from applicants who have had experience in the erection and maintenance of high and medium voltage wood pole lines; experience in working on lattice towers will be an advantage.

Wages and conditions of service, N.J.I.C.; present rate, 37/50d. per hour, £6 17s. 6d. for a 44-hour, 5-day week.

Applications, stating age, qualifications, training and experience, to be received by the Manager, No. 4 Sub-Area, North Western Electricity Board, 40/41 Lune Street, Preston, by February 9, 1952. (P 814)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable appointments at BRUNSWICK WHARF GENERATING STATION. Salary and conditions of service in accordance with N.J.B Schedule A, Class "H" (anticipated K in 1956), including London Allowance.

SHIFT CHARGE ENGINEERS

Candidates should have received a sound technical training in electrical and mechanical engineering and practical experience in the operation and maintenance of a modern generating plant with pulverised fuel fired boilers. Character and ability to deal with Staff problems is important. Grade 7, £784 7s. p.a.

ASSISTANT SHIFT CHARGE ENGINEERS

Candidates should have good technical training and a sound experience of the efficient Boiler House, Turbine House and Electrical operation of a modern Power Station. Grade 9, £693 p.a.

STATION SHIFT CONTROL ENGINEERS

Candidates should have had a good general education and technical training with experience in the operation and control of E.H.T. Switchgear. Grade 10, £652 1s. p.a.

JUNIOR ENGINEER (OPERATION)

Candidates should have a sound experience of Boiler House or Turbine House operation of a modern Power Station. Technical qualifications of at least Ordinary National Certificate Mechanical. Grade 15, £437 p.a.

ASSISTANT ENGINEER (REPAIR AND MAINTENANCE PLANNING)

Candidates should have experience of overhauls of major equipment in a modern Power Station and able to co-ordinate the planned overhauls of Boiler and Turbine Units. Grade 11, £616 7s. p.a.

ASSISTANT MAINTENANCE ENGINEER (TURBINE HOUSE AND MACHINE SHOP)

Candidates should have served an apprenticeship and received a sound engineering training and have experience of maintenance of modern Turbine Plant and running a large machine shop. Technical qualifications of up to Higher National Certificate, Mechanical. Grade 10 £652 1s. p.a.

ASSISTANT MAINTENANCE ENGINEER (BOILER HOUSE AND COAL HANDLING PLANT)

Candidates should have a sound engineering training and have experience of maintenance of modern Boiler Plant. Technical qualifications of up to Higher National Certificate, Mechanical. Grade 10, £652 1s. p.a.

ASSISTANT ENGINEER (ELECTRICAL TEST)

Candidates should have sound electrical experience with a special knowledge of protective systems and relays. Technical qualifications of up to Higher National Certificate, Electrical. Grade 13, £528 3s. p.a.

INSTRUMENT ENGINEER

Candidates should have experience of all types of instrument repair and maintenance, especially with Automatic Boiler control equipment. Technical qualifications of Higher National Certificate, Mechanical. Grade 12, £572 5s. p.a.

ASSISTANT ENGINEER (INSTRUMENTS)

Candidates should have experience of all types of instrument repair and maintenance, especially with electrical control equipment. Technical qualifications of Ordinary National Certificate, Electrical or Mechanical. Grade 14, £504 p.a.

ASSISTANT MAINTENANCE ENGINEER (ELECTRICAL)

Candidates should have had experience of maintenance of E.H.T. Switchgear and Station electrical auxiliaries in a modern Power Station. Technical qualifications of Higher National Certificate, Electrical. Grade 9, £693 p.a

ASSISTANT ENGINEER (EFFICIENCY)

Candidates must have had experience in the efficient operation and carrying out of test on steam and mechanical plant, preparing reports and interpreting the results of such tests. Technical qualifications of up to Higher National Certificate, Mechanical. Grade 11, £616 7s. p.a.

ASSISTANT ENGINEER (STATISTICS)

Candidates should have had experience of compiling results of tests and extracting operation data from Operation daily sheets. Technical qualifications of Ordinary National Certificate, Mechanical. Grade 14, £504 p.a.

ASSISTANT ENGINEER (HANDLING)

Candidates should have good experience of coal and ash handling, ash quantity estimating, quay berthing procedure, shipping, rail and road transport organisation Technical qualifications of Higher National Certificate (Mechanical or Electrical). Grade 12, £572 5s. p.a.

(Continued in next column)

(*Continued from previous column*)

JUNIOR ENGINEER (CONTROL)

Candidates should have had experience of Control Room operation and records. Technical qualifications of at least Ordinary National Certificate (Electrical). Grade 15, £437 p.a.

Applications are also invited for the following superannuable appointments:—

ENGINEERING DRAUGHTSMAN—BRUNSWICK WHARF GENERATING STATION

Candidates should have knowledge of Engineering Drawing, Drawing Office procedure and record keeping.

Salary and conditions in accordance with N.J.B. Schedule D, Grade 6, £438 to £574 7s. p.a., inclusive of London Allowance.

JUNIOR ENGINEER—BLACKWALL POINT GENERATING STATION

Candidates should have had a sound technical training and preferably have reached the standard of the Higher National Certificate in Electrical Engineering or its equivalent. Previous experience in Generating Station an advantage.

Duties will include operation and control, under supervision, of generating plant. Good opportunities offered for gaining experience with modern P.F. Boilers, Turbines and Auxiliary Plant. Applicants must be prepared to accept shift duties if required.

Salary and conditions in accordance with N.J.B. Schedule A, Class "F," Grade 14, £456 p.a. inclusive of London Allowance.

SHIFT CHARGE ENGINEER—STEPNEY GENERATING STATION

Candidates should have received a sound electrical and mechanical training and have experience in the efficient operation of a Generating Station. Character and ability to deal with Staff problems is important.

Salary and conditions in accordance with N.J.B. Schedule A, Class "F" Grade 7, £710 17s. p.a., inclusive of London Allowance.

Applications for all the foregoing vacancies, stating age, qualifications and experience, should be addressed to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1., to be received within 14 days of the publication of this advertisement.

H. V. PUGH,
Divisional Controller.
(P 815)

BRITISH ELECTRICITY AUTHORITY

North Western Division

THERE are vacancies for 2 JUNIOR ENGINEERS at Westwood Generating Station, Wigan. Commencing salary £375, rising to £471 (N.J.B. G.16.14). Duties will lie in the control room and be those of assistant to the control engineer on shift. Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, before February 9, quoting vacancy No. 660. (P 816)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

DEPUTY STATION SUPERINTENDENT required at Ocker Hill Generating Station, Tipton, Staffs. National Joint Board service conditions, superannuable appointment, commencing salary in accordance with Schedule A, Class "F," Grade 3 (£887 per annum).

Successful applicant will be responsible to Station Superintendent for efficient operation and maintenance of the station. Membership of one of the senior engineering institutions an advantage.

Application forms available from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by February 16, 1952.

F. W. LAWTON,
Divisional Controller.
(P 790)

ARMATURE AND STATOR WINDER, also IMPROVERS with electrical or mechanical knowledge on small electric motors. South London area. State age and experience.—Box No. 1419, Electrical Times. (P 776)

ASSISTANT RATE-FIXER required for industrial switchgear. Applicants should have experience in this work particularly for machine shop and be capable of estimating times from blue prints. Applications in writing, giving particulars of age, training, experience and salary expected to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, London, S.E.7. (P 708)

BUYER required by medium-sized firm of electrical engineers; works near Walsall. Only experienced man need apply.—Box No. 1421, Electrical Times. (P 777)

CONTRACT AND TENDERING ENGINEERS required for switchgear department. Men aged 21 to 30, with experience of l.t. and h.t. switchgear up to 11 kV are invited to apply. Knowledge of 33 kV gear would be an advantage. First-class conditions with non-contributory pension scheme. Possible housing assistance.—Please apply, giving full details of training, experience, age, etc., to the Chief Personnel Officer (E.D.), The Brush Electrical Engineering Co., Ltd., Loughborough, Leicestershire. (P 730)

DRAUGHTSMAN required for contracts section, experienced on flat back and cubicle-type switchgear, and able to do diagrams. SWITCHGEAR DEVELOPMENT DRAUGHTSMAN also required, with experience on switchgear and motor control gear. Good salary offered for suitably qualified applicants. Pension scheme available.—Reply, stating age, salary and full details of technical qualifications and experience, to Erskine, Heap and Co. Ltd., Lancashire Switchgear Works, Salford, Manchester 7. (P 671)

DRAUGHTSMEN. Engineering Consultants have vacancies for Mechanical Engineering Draughtsmen, experienced in power station design and layout, pipework layout, circulating water systems or coal and ash handling plants, but draughtsmen with good experience on other work might be considered. Positions are permanent with good prospects, and are pensionable. Free lunches are provided and a five-day week is in operation. —Applicants should write, stating age, experience and salary required, to the Secretary, Ewbank & Partners Ltd., 10/11 Grosvenor Place, London S.W.1. (P 826)

DRAWING AND TRACING, LTD., have vacancies for experienced SENIOR DRAUGHTSMEN and JUNIOR DETAIL DRAUGHTSMEN in their production drawing office, specialising in radio, electrical and mechanical engineering. 5-day week. Pension scheme. Good working conditions. Salary range £390-£533.—Write, stating age and experience, 456 Ewell Road, Surbiton, Surrey. (P 431)

ELECTRICAL DRAUGHTSMAN with some knowledge of motor starting resistance design preferred, but not essential. Age between 22 and 30 years.—Write, stating experience and salary required to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 750)

ELECTRICAL ENGINEER required with some knowledge of switchgear or resistance manufacture. Applicants should be between the ages of 22 and 30 years. —Write, in first instance, stating experience and salary required, to E. A. and J. Y. Walsh Ltd., Barton Road Works, Worsley, Manchester. (P 749)

ELECTRICAL FOREMEN. The Steel Company of Wales Ltd., has vacancies for Electrical Maintenance Foremen at its Abbey Works. Industrial experience is essential, preferably in a large integrated steelworks.—Applications, giving full particulars of qualifications and experience, should be addressed to the Personnel Superintendent, The Steel Company of Wales Ltd., P.O. Box No. 3, Port Talbot. (P 822)

ENGINEERS, aged 25 to 40 years, required for senior and junior positions in test and service department (based on London). Duties involve starting-up, efficiency testing, and service work chiefly on land water-tube boilers up to power station capacities. Experience of this or similar type of work is desirable. Applicants holding M. of T. naval watch-keeping or equivalent certificate preferred. Works apprenticeship essential. Salary from £600 to £750 per annum according to qualifications. Contributory pension scheme.—Apply, in writing, stating age, full particulars of experience and qualifications to Foster Wheeler Limited, 3 Ixworth Place, S.W.3. (P 770)

FERRANTI LIMITED have vacancies for qualified DRAUGHTSMEN in the Transformer Department for: (a) design of distribution transformers up to 100 kVA. Previous transformer experience desirable but not essential. (Ref. TDO(D)). (b) Design and layout of plant. (Ref. TDO(P)). Permanent staff appointments with pension benefits.—Forms of application from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote appropriate reference. (P 748)

GRADUATE ELECTRICAL ENGINEERS required to be trained as designers of electrical equipment for Diesel-electric locomotives. Practical workshop experience of manufacture and testing of this equipment preferred, together with good Honours Degree in electrical engineering. Age range 25-30 years. Good salary, prospects and facilities for advanced technical education. Excellent working conditions.—Please reply in confidence to Box No. 1375, Electrical Times. (P 642)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

GRADUATE ELECTRICAL ENGINEER for electrical laboratory work associated with cable development. Previous experience not essential. Salary according to experience and qualifications.—Applications in writing to the Staff Officer, British Insulated Callender's Cables Ltd., Prescot, Lancs. (P 794)

HYDRO-ELECTRIC ENGINEERS.
Applications are invited by Consulting Engineers in Westminster for the following positions:—
1. CONTRACT ENGINEER for executive work on heavy plant contracts. Experience on home and overseas work, including preparation of specifications and contracts and handling of technical problems is essential. Applicants should have a good general mechanical engineering background, preferably with specialised experience on water turbines, pumps, valves, gates and cranes. Some knowledge of alternators and electrical work, including automatic equipment for hydro-electric stations is desirable.
2. ASSISTANT HYDRAULIC DESIGN ENGINEER, mainly for investigation layout, and design work on plant for hydro-electric projects. Applicants should be good draughtsmen and should have experience of design, model and field testing of hydraulic machinery, water-hammer analysis and preferably some knowledge of engineering economics and hydraulic structures, including pipelines. Practical operating experience in water power plant would be an advantage.
The minimum qualification for either post is University Degree and Associate Membership of the Institution of Civil, Mechanical or Electrical Engineers. Salary will be based on previous experience and qualifications. Applications, which should be received not later than March 3, should be addressed to Box No. 1431, Electrical Times. (P 819)

IMPERIAL CHEMICAL INDUSTRIES, LTD., General Chemicals Division, invite applications for the position of ASSISTANT ENGINEER in the company's power department, Runcorn, to take charge of the operation of a number of groups of Lancashire and Economic type boilers. Applicants, who should not be more than 40 years of age, should have had a sound practical and technical training in mechanical engineering and should hold a Higher National Certificate in Mechanical Engineering or equivalent qualification. They should have had good experience of the operation and maintenance of steam boilers and their auxiliaries and should be able to carry out investigations into the thermal performance of such plants.—Apply in writing, giving full particulars, to Staff Manager, Imperial Chemical Industries, Ltd., General Chemicals Division, Cunard Building, Liverpool 3. (P 714)

INFORMATION OFFICER. To assist in technical library and information service for research, engineering and commercial personnel of a large electrical engineering firm in the N.W. Technical qualifications in engineering or physics essential. Knowledge of French or German and some experience in library classification added qualifications. Salary will depend on qualifications and experience, and will be progressive.—Reply, giving particulars of training and experience, marking envelopes "Information Officer" to Box No. 1415, Electrical Times. (P 774)

JUNIOR TEST ENGINEER for high voltage testing work. Age 20-25 years. Technical education to at least Ordinary National Certificate standard. Previous electrical testing experience necessary.—Write for interview, giving training and experience to the Assistant Secretary, The Micanite and Insulators Co., Ltd., Empire Works, Blackhorse Lane, E.17. (P 779)

KINGSTON 'B' POWER STATION.—SHIFT CHARGE ENGINEER. Experience essential in the administration and operation of a large Power Station operating at high pressure and temperature and in the operation of E.H.T. switchgear. N.J.B. Conditions, Class "G," Grade 7, £739 4s. p.a., including London Allowance.—Apply by February 11, 1952 on forms obtainable from British Electricity Authority, S.E. Division, Lower Ham Road, Kingston-on-Thames. (P 798)

MINISTRY OF FUEL AND POWER: ELECTRICAL INSPECTOR OF MINES AND QUARRIES. The Civil Service Commissioners invite applications from men. The post is permanent and is in the provinces.
Candidates must be at least 27 years of age on March 1st, 1952, and must
(a) hold a degree in Electrical Engineering, or have passed the examination for Associate Membership of the Institution of Electrical Engineers, or show evidence of suitable training as an electrical engineer; and
(b) have had within the last five years at least 2 years' practical experience in the application of electricity to mining conditions.
Inclusive London salary scale £750-£950. Rather less in the provinces. Starting pay is linked to age 30 with deduction of £25 for each year below 30 and addition of £25 for each year above 30 subject to a maximum of £800 at age 32 or over. These rates are at present under review.
Prospects of promotion.
Further particulars and application forms from Secretary, Civil Service Commission, Scientific Branch, Trinidad House, Old Burlington Street, London, W.1, quoting No. S 4118/52. Completed application forms must be returned by March 6, 1952. (P 800)

LEADING AND SENIOR DRAUGHTSMEN required for transformer work of the largest class.—Apply by letter, quoting "Transformer" and giving full details of age, experience and salary required to Staff Manager, General Electric Co., Ltd., Witton, Birmingham 6. (P 595)

METER TESTER required at Newcastle-under-Lyme, Staffs. Experience of all types of A.C. and D.C. Meters essential. Wages at present 3s. 2½d. per hour. N.J.I.C. Conditions. Apply, in writing, within seven days stating age and full experience etc., to Sub-Area Manager, Midlands Electricity Board, 31 Kingsway, Stoke-on-Trent. (P 820)

MODERN switchgear factory in pleasant surroundings with housing available for married men, has the following vacancies: (a) DESIGN ENGINEER to take charge of current and new projects 33 kV and 66 kV metal-clad and outdoor oil circuit breaker equipment. (b) DESIGN DRAUGHTSMEN with experience of oil circuit-breaker equipment up to 66 kV. Expenses paid for interview; superannuation scheme.—Applicants should give full particulars of previous experience, qualifications and salary required to (a) General Manager, (b) Personnel Manager, South Wales Switchgear, Ltd., Blackwood, Mon. (P 718)

PROGRESS CLERK required for industrial switchgear department. Previous experience in erection and machine shop work an advantage.—Applications in writing giving particulars of age, training, experience and salary expected to Employment and Welfare Manager, Johnson and Phillips, Ltd., Victoria Works, London S.E.7. (P 709)

QUALITY CONTROL SUPERVISOR for manufacture of Paper Ins. Power Cables up to high voltages. National Certificate standard with knowledge of Power Cable materials. Previous manufacturing experience an advantage. Age 22 to 30 years. Good salary with prospects. —Apply in writing to Staff Officer, British Insulated Callender's Cables Ltd., Belvedere, Kent. (P 821)

SALES ENGINEER for Midlands Area required by manufacturers of medium voltage industrial and Domestic Switch and Fusegear, H.R.C. Fuses, O.C. Bs., Switchboards, Control Panels, Sub-Station Gear etc. Excellent prospects for energetic man with experience to take over sole representation on salary and commission basis.—Box No. 862, Lee & Nightingale, Liverpool. (P 823)

SCIENCE OR ENGINEERING GRADUATE. To train in technical library and information service of large industrial research establishment in the N.W. Knowledge of French or German preferred. Progressive post.—Reply, giving qualifications, age, etc., marking envelopes "Graduate" to Box No. 1417, Electrical Times. (P 775)

SENIOR DESIGN DRAUGHTSMAN required by light engineering firm for design work on precision limit switches. Applicants must have had wide experience in this class of work, in the radio or instrument manufacturing industry.—Burgess Products Co., Ltd., (Micro Switch Division), Dukes Way, Team Valley, Gateshead 11. (P 716)

SWITCHGEAR MANUFACTURERS in Manchester area require young ELECTRICAL ENGINEER in the Research Department with experience of short-circuit testing and interpretation of oscillographic records. Applicants should be of degree or H.N.C. standard. Good prospects for a man with drive and initiative.—State age, qualifications and experience to Box No. 1433 Electrical Times. (P 824)

TECHNICAL ASSISTANT required for Works Engineers office to plan all electrical development work and maintenance of a Steel Foundry and Engineering Works. Applicants should be aged 25/30 with H.N.C. or equivalent standard of education.—Full particulars to Works Engineer, K. & L. Steelfounders & Engineers Limited, Letchworth, Herts. (P 825)

TECHNICAL ASSISTANT. A large light electrical engineering company, in the West London area, require a Technical Assistant for their engineering laboratory. Applicants should have a good working knowledge of domestic electrical and mechanical appliances, including radio, television and industrial electronics. Minimum qualification Higher National Certificate (Electrical). Special knowledge of electronics an advantage. Good conditions and pay.—Write, giving details of age, qualifications and experience to Box No. 1423, Electrical Times. (P 780)

THE EASTERN ELECTRICITY BOARD have vacancies for STOREKEEPERS at their Beehive Lane Depot, Chelmsford. Applicants must write legibly and be accurate with figures. Rates of pay and conditions of employment will be those laid down by the National Joint Industrial Council for manual workers in the electrical supply industry, the present rate of pay and conditions being 2/11¼d. per hour for a 44-hour, 5-day week.—Apply in writing, stating age, previous experience and present occupation, etc., to the District Manager, Chelmsford District, Eastern Electricity Board, Anchor Street, Chelmsford, Essex. (P 778)

TECHNICAL WRITER required to assist editor of house journal and other publications. Applicants should have an engineering degree followed by apprenticeship and some experience of writing is desirable.—Write, giving full details and salary required to Publicity Manager, Metropolitan-Vickers Electrical Co., Ltd., Mosley Road, Trafford Park, Manchester 17. (P 832)

TRANSFORMER SALES ENGINEERS are required by the English Electric Co., Ltd., at Stafford. Preference will be given to applicants who have served a recognised apprenticeship in heavy electrical engineering and who are of at least H.N.C. standard.—Please write, giving full details and quoting Ref. 396A to Central Personnel Services, English Electric Co., Ltd., 24-30 Gillingham Street, London S.W.1. (P 793)

TRANSFORMER SALES ENGINEER required for Head Office of large firm in the Midlands. Technical qualifications of at least H.N.C. standard in electrical engineering. Previous experience of power transformers desirable, but men otherwise suitably qualified will be trained. Excellent conditions with good salary.—Please apply with full details of training, qualifications, age, etc., to Box No. 1429, Electrical Times. (P 792)

APPOINTMENTS FILLED

BOX NO. 1325. The advertiser wishes to thank all applicants and inform them that the post of FOREMAN-ELECTRICIAN has now been filled. (P 796)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CASTINGS. Fisher Foundries Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham, Victoria 0197. (P 570)

ENQUIRIES invited for repetition ARMATURE AND STATOR WINDING. Prompt delivery offered.—Magstarlite, Ltd., Beavor Works, Beavor Lane, Hammersmith, London, W.6. (P 411)

FRACTIONAL motors, Armatures and field coils wound. Output, 250 armatures per week.—Lowdon Bros. and Co. (Engineers) Ltd., Temple Electric Works, Dundee. (P 577)

NON-FERROUS Casting Capacity available.—Sandyford Foundries Ltd., Boston Works, Sandyford, Stoke-on-Trent. (P 801)

TOROIDAL WINDING. Your inquiries are invited for this type of winding, to your own specification.—Frank Hewitt, Ltd., Cross Street, Radcliffe, Lancs. (P 632)

WANTED

A LARGE quantity of CONDUIT AND FITTINGS in all sizes required for immediate cash. Continual orders will be given.—Dublin Wholesale, 39 Westland Row, Dublin. (P 621)

A.C./D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5106. (A 20)

ENAMELLED COPPER WIRE, size ·0064 in. (37½ G), in any quantities up to 500 lb.—Submit offers to Box No. 1379, Electrical Times. (P 651)

£50,000

Immediate cash available for purchase of New Ball and Roller Bearings, all types, Steel Balls and Rollers. Top prices Paid, small quantities accepted.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
Renown 6174 (P 546p)

SCRAP ACCUMULATOR PLATES and Sediment wanted, any quantities. Also Storage Batteries purchased and dismantled.—Phone or write, Elton Levy Co. Ltd., St. Ermin's (West Side), Caxton Street, London S.W.1. Tel.: WHItehall 9621/2/3. (A 3)

STEEL SHEETS, PLATES, STRIP and BARS. Any quantity, immediate payment.—Grades Sheared Metal Co., Ltd., Green Lane, Hounslow, Middx. Tel.: Feltham 3274. (P 582)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, MOTOR ALTERNATOR SETS, Alternators or similar equipments to give electrical output of 115 V, 400 c/s, 3 phase. Any capacity.—Staravia, Blackbushe Airport, Camberley, Surrey. (P 782)

WANTED, 50/60 h.p., 440 V d.c., 1,000 r.p.m. Motor with starter. Output shaft min. 7 in., ball or roller bearings, fan ventilated.—Bailey's Fertilizers, Ltd., 29 Mincing Lane, London, E.C.3. (P 827)

WANTED. D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

10 GEARED MOTORS required, 230/1/50, about ¾ h.p. and about 30 r.p.m.—Box No. 1425, Electrical Times. (P 781)

AGENCIES

ACTIVE EXPORT DISTRIBUTORS with excellent overseas connections, invite offers from manufacturers. —Box No. 1435, Electrical Times. (P 830)

AGENTS REQUIRED in all parts of British Isles for low priced, high quality, fast selling fluorescent lighting fittings. Sole area concessions to suitable applicant.—Further particulars from manufacturers, Box No. 1427, Electrical Times. (P 783)

BUSINESS OPPORTUNITIES

ADVERTISER desires to dispose of his majority holding in a company formed for the manufacture of a patented electrical apparatus, which has potential sales to domestic and industrial users, with excellent export prospects. Tooling in an advanced stage.—Write Box No. 1367, Electrical Times. (P 636)

FOR SALE

CABLES & WIRE

D.C.C. COPPER WIRE available ex-stock: 2½ tons 26G.; ½ ton 23G. Also EN. & S.A.S. COPPER WIRE: ½ ton 42G. and P.V.C. 44,000 yd. 1/044.—The Mulberry Co., 223 St. John St., London, E.C.1. Tel.: Clerkenwell 8356-7-8. (P 584)

LEAD-SHEATHED and V.I.R. CABLE (several tons), various gauges. New and used.—Box No. 1399, Electrical Times. (P 722)

DOMESTIC APPLIANCES

IMMERSION HEATERS. Grubb 4 kW, no purchase tax. All lengths 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Prompt delivery. Write for latest lists and trade terms to Distributors—John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

IMMERSION heaters. Grubb, 16", 3-4 kW, complete with stat. and mech. flange, £6 8s. 8d. Other sizes 11" to 42".—Horton & Son, Ltd., 15 Palmerston Rd, Sutton, Surrey. (P 829)

ENGINEERING PLANT & MATERIALS

80,000

NEW BALL RACES, ROLLER, THRUST AND TIMKEN RACES in stock. Advise requirements.

CLAUDE RYE LTD.,
895-921 Fulham Road, London, S.W.6
Renown 1174 (P 547p)

LIGHTING EQUIPMENT

COVENTRY Climax 3 kW 230 V a.c. GENERATING SETS. Reconditioned and fully guaranteed.—Magstarlite Ltd., Beavor Works, Beavor Lane, Hammersmith, London W.6. (P 412)

PURLEY CHOKES AND BALLASTS. Our 80 W Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings. 57/6 each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

GENERATING PLANT

FOR SALE, Morrison automatic 6-kVA generator with Petter A.V.2 twin diesel engine. As new. Full particulars.—Messrs. Stiffs Concrete Co., Springfield, nr. Dudley, Worcs. Tel.: Blackheath 1060. (P 753)

ONE 22.5-kW petrol engine-driven d.c. 230V generator set, comprising 4-cyl. Morris Mark II engine, C.P. generator on fabricated bed, with petrol tank and radiator; practically new. Too small for owners' use.—Alders (Tamworth), Ltd., Tamworth, Staffs. (P 755)

STEAM DRIVEN GENERATING SETS. 2,500-kW (3,125 kVA) pass out TURBO-ALTERNATOR SET by Howden-Siemens, for 480/3/50, speed 3,000 r.p.m. Steam pressure 195 lb sq in, temperature 510° F, passing out 50,000 lb steam per hr at 40 lb pressure. Mirrlees surface condenser and condenser pump.

665-kVA (500 kW) steam-driven ALTERNATOR SET by Belliss and Morcom-Siemens, for 5,000/3/50, 77 amps. Steam pressure 150/155 lb. Speed 333 r.p.m.

313-kVA STEAM ALTERNATOR SET by Browett Lindley-Westinghouse, for 400/440/3/50, 4 wire, 452/410 amps., 428 r.p.m. Steam pressure 160/200 lb, exhausting to vacuum or atmosphere. Total temp. up to 537° F. Makers advise that with steam at 180/200 lb could be operated with 5/10 lb back pressure.

George Cohen, Sons, and Co., Ltd., Wood Lane, London W.12. Tel.: Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (P 786)

9-kVA PETROL ENGINE Generating Set, 220 V, a.c., 16-h.p., 4-cylinder Meadows Engine. Complete with control panel. Battery charging unit. Complete with switch and control panels.—O.T.M. Machinery, Ltd., Station Road, Egham. Tel. 220. (P 626)

DIESEL GENERATORS
by
HOUCHIN

100 kVA GMC generating plant now available for almost immediate delivery to the home market only.

Incorporating the famous HLD alternator

Details and specification on request from the actual manufacturers:

THE HOUCHIN ORGANIZATION
Garford Works, Garford Street, London, E.14
Tel. East 4123 (5 lines) Grams: Garfodia London
(P 733p)

MOTORS & STARTERS

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.
STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC
Any voltage, new, short delivery, all types of revolving electrical power.
ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London N.W.9.
Telephone: COLindale 4621/2. (D 17p)

A.A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks fully guaranteed.—Milo Engineering Works Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9.) (A 10)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

SPECIAL offer: 25 new 1/6-h.p. cap. MOTORS, 230/1/50, 1,425 revs., B.T.H.—£5/10/- each.—Sugdens, Glenny Rd., Barking. (P 633)

METERS

A.C./D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gdns., N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, a.c. and d.c., new and reconditioned, all types. Quarterly, single and three-phase, 3 and 4-wire, 2½ to 1,000 amp. Prepayment, single and double tariff; single, dual and triple coin; fixed and variable tariff, 2½ to 50 amp. M.D.I., billiards switches, rent collectors. Prices from 5/-, carriage paid. Guaranteed for ever. Immediate delivery.—Illustrated catalogue from The Electric Meter Co., Castor Road, Brixham. (P 334)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

ONE "English Electric," built up, sheet steel, totally enclosed floor mounting, horizontal drawout isolating, "OB. 33" TRUCK TYPE SWITCHBOARD, suitable for use on 3,300 volt 3 phase 50 cycle supply. Condition "as new." Full details on application. Available for inspection in Chester area. Offers invited.—Write Box Z.N. 873, Deacon's Advertising, 36 Leadenhall Street, London, E.C.3. (P 828)

ONE "Switchgear & Cowans" Class SG2 CIRCUIT BREAKER 6,600 volts, 80 amps with three 100 amps overload coils with potential Transformer, Voltmeter and Ammeter. Max. M.V.A. capacity 100.—Box No. 1437 Electrical Times. (P 833)

TRANSFORMERS & CONVERTORS

FOR sale, Transformer, 100 kVA, 11,000-440 V, British Electric, complete with h.t. and l.t. switchgear. £300 or offer.—Best & Lloyd, Wattville Rd, Birmingham. (P 784)

UNCLASSIFIED

BATTERY CHARGING SWITCHBOARD on steel frame 2 ft 5 in. by 2 ft 3 in. Two charging circuits up to 4 and 15 amps. Fitted with regulators, ammeters, cut-outs and switch fuses. 90/-, carr. paid.—Farrows, Spalding. (P 795)

BUSINESSES FOR SALE

ELECTRICAL CONTRACTOR'S BUSINESS, with showroom, workshop, office, stores, etc., and adjoining shop let to multiple firm on long lease. Good living accommodation over. Prominent position, busy west Surrey town. Freehold and goodwill, £10,000 S.A.V.—Dunman, James and Co., 29 South Street, Farnham. Tel. 4189. (P 785)

WHOLESALE organisation, with established connections with large wholesale and trade houses throughout the British Isles for electrical fittings, and sole distributors for well-known refrigerators for various Northern Counties, desires to sell as a going concern. Controlling Director retiring for health reasons, no commitments except lease for limited period.—Will those interested communicate in writing, to Allife Limited, 338 Streatham High Road, S.W.16. (P 693)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook, FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 244)

FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College operated by an Industrial Organisation. Moderate fees.—E.M.I. Institutes, Postal Division, Dept. ET.29, 43 Grove Park Road, London W.4. Chiswick 4417. (Associate of H.M.V.). (P 507)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. (Tel.: TEMple Bar 7471. (A 29)

THE PROPRIETOR of British Patent No. 611793 for IMPROVEMENTS RELATING TO CONTROL SYSTEMS FOR DISCHARGE LAMPS, desires to enter into negotiations with a firm or firms for the sale of the patent or for the grant of licences thereunder.—Further particulars may be obtained from Marks and Clerk, 57 and 58, Lincoln's Inn Fields, London W.C.2. (P 831)

RENOWNED FOR RELIABILITY

'ARORA'

electrical heating appliances

- INDUSTRIAL
- CATERING
- DOMESTIC

The ARORA Company

ROSEBERY STREET, LOUGHBOROUGH

Specialists for over 30 years.

208

The new SWIRLUX Type 501 is now available

Limited numbers of this 'large capacity—low price' washing machine, with its new SWIRLUX patented agitator and full-size Acme hand wringer are now available for distribution in the home market.
Further details of this remarkable 'family' washer are available from the manufacturers:

UNIVERSAL BOILERS & ENGINEERING Co. Ltd.
Burnley, Lancs.

A 'VERSCO' PRODUCT

ndh

INDEX TO ADVERTISERS

Aidas Electric Co., Ltd. 14
Arora Co. 63
Ash & Lacy, Ltd. 66
Associated Lead Manufacturers, Ltd. 5
Automatic Light Controlling Co., Ltd. 78
Bayliss, Jones & Bayliss, Ltd. ... 19
Beetle Products Co., Ltd. ... 39
Best Products, Ltd. 12
British Electric Resistance Co., Ltd. 7
British Electricity Authority ... 8
British Insulated Callender's Cables, Ltd. 27
British Thomson-Houston Co., Ltd. 11, 29
Britmac Electrical Co., Ltd. ... 35
Brook Motors, Ltd. 77
Burco, Ltd. 70
B.V.C. Industrial Constructions, Ltd. 48
Bylock Electric, Ltd. 4
Cable Makers' Association ... 69
Carter & Co. (Nelson), Ltd. ... 82
Chamberlain & Hookham, Ltd. ... 45
Clang, Ltd. 78
Cole, E. K., Ltd. 70
Copper Development Association 33
Coughtrie, J. & G., Ltd. 9
Cressall Manufacturing Co Ltd. 4
Critchley Bros., Ltd. 36
Crompton Parkinson, Ltd. 2, 16
Derby & Co., Ltd. 78
Dexion, Ltd. 70
Dorman & Smith, Ltd. 72
East London Mica Works ... 18
Edison-Swan Electric Co., Ltd. ... 80
Edwards, F. J., Ltd. 82
Eeto Insulations 12
Ekco-Ensign Electric, Ltd. ... 32
Elliott Bros. (London), Ltd. ... 37
Engel & Gibbs, Ltd. 40
English Electric Co., Ltd. 6, 25, 71
Evans & Newall, Ltd. 74
Electrical Industries Benevolent Association 29
Fenton Byrn & Co., Ltd. ... 28
Ferranti, Ltd. 1
General Electric Co., Ltd. 52, 83
Gledhill-Brook Time Recorders, Ltd. 12
Grimmer, W. H. 74
Harris, John, Tools, Ltd. ... 4
Henley's W.T. Telegraph Works Co., Ltd. 53, 66
Higgs Motors, Ltd. 10
Hillman Electric Motors, Ltd. ... 80
Ismay Lamps, Ltd. 76
Johnson & Phillips, Ltd. 41
Kautex, Ltd. 31
Kaye, E. & E., Ltd. 44
Lancashire Dynamo & Crypto (Mfg.), Ltd. 73
Lister, R. A. & Co., Ltd. ... 28
Low, Duncan, Ltd. 18
Lyons, Claude, Ltd. 21
Mather & Platt, Ltd. 24
McGeoch, William & Co., Ltd. ... 40
Mek-Elek Engineering, Ltd. ... 82
Metropolitan-Vickers Electrical Co., Ltd. 23, 67
Metway Electrical Industries, Ltd. 34
Midland Electric Manufacturing Co., Ltd. 65
National Cash Register Co., Ltd. 66
National Fire Protection Co., Ltd. 82
Nife Batteries, Ltd. 3
Nu-Swift, Ltd. 80
Parmiter Hope & Sugden, Ltd. ... 85
Parsons, C. H. (Britmac), Ltd. ... 35
Partridge Wilson & Co., Ltd. ... 64
Permali, Ltd. 24
Philips Electrical, Ltd. 30
Pitman, Sir Isaac & Sons, Ltd. ... 30
Powell, Duffryn Carbon Products Ltd. 26
Power Centre Co., Ltd. 46
Pyrotenax, Ltd. 81
Radiovisor Parent, Ltd. 72
Record Electrical Co., Ltd. ... 15
Reyrolle, A. & Co., Ltd. 13
Rowlands Electrical Accessories, Ltd. 68
Sanders, William, & Co. (Wednesbury), Ltd. 82
Sangamo Weston, Ltd. 54
Sax, Julius & Co., Ltd. 30
Scemco, Ltd. 80
Senior Economisers, Ltd. ... 84
Serck Tubes, Ltd. 40
Sew-Tric, Ltd. 36
Siemens Electric Lamps & Supplies, Ltd. 75
Simmonds & Stokes (Niphan), Ltd. 76
Simon-Carves, Ltd. 22
Smith, Frederick & Co. 17
South Wales Switchgear, Ltd. ... 43
Standard Telephones & Cables, Ltd. 42
Steatite Insulations, Ltd. ... 44
Steatite & Porcelain Products, Ltd. 34
Taylor Tunnicliff & Co., Ltd. ... 49
Thompson, J., Water Tube Boilers, Ltd. 86
T.M.C. Harwell (Sales), Ltd. ... 79
Tudor Accumulator Co., Ltd. ... 20
Universal Boilers & Engineering Co. Ltd. 63
Venner, Ltd. 50
Ward, Thomas, W., Ltd. 78
Westinghouse Brake & Signal Co., Ltd. 47
Wireohms, Ltd. 74
Wootton & Co., Ltd. 74
Yorkshire Electric Transformer Co., Ltd. 38

AUTOMATIC PUMP

★ THE PUMP IS COMPLETELY AUTOMATIC
★ NO MAINTENANCE NEEDED
★ LOW RUNNING COSTS
★ MERELY PLACE IN FLOOR SUMP

Ideal for flooded basements, beer cellars, etc. It operates with a 4½-in. rise or fall of water in the sump, or can be completely submerged in water. Requires no elaborate fitting. The Davenset Automatic Pump will run continuously for 3 or 4 hours on one unit of electricity. Designed to operate against a maximum head of 20 ft.

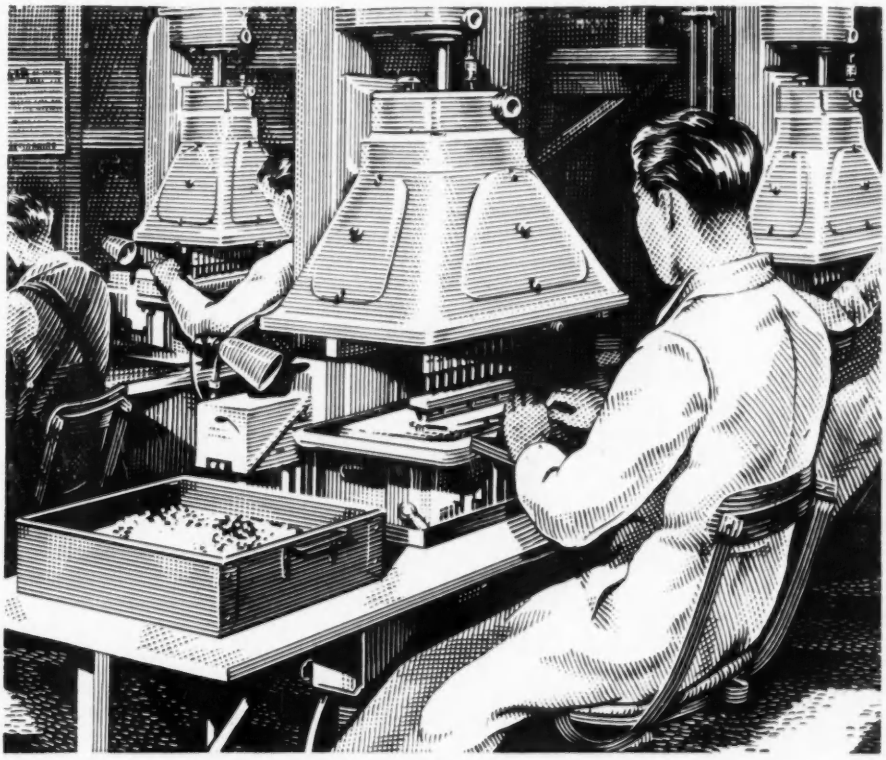
DAVENSET

ANOTHER DAVENSET PRODUCT:
—BUILT FROM THE FIRST—TO LAST

For further details write to :—

PARTRIDGE WILSON & CO. LTD. DAVENSET ELECTRICAL WORKS. LEICESTER. 5

It all comes into Switchcraft



TEN HEADS ARE BETTER THAN ONE

This special machine has ten heads to drill or tap ten contacts in one operation. Wherever you look in the MEM works you find ideas for speeding production, ensuring precision, and improving quality. And this applies to every part that goes into MEM gear because every bit of it is made in MEM's own factory. That's why MEM can offer you a finely made starter or switchfuse at a surprisingly low price.

MEM Switch, fuse and motor control gear, electric fires and localised lighting equipment

'MEMSPEL' is the new metal-clad switchgear designed specially for S P & N duty.

MIDLAND ELECTRIC MANUFACTURING CO. LTD., BIRMINGHAM 11

SOLONS FOR ESSENTIAL JOBS!

Use SOLONS for the jobs that matter — this modern precision tool makes soldering speedier, simpler and more reliable. 5 models: 65 watt with oval tapered and round pencil bit; 125 watt with oval tapered and round pencil bit; 240 watt with oval tapered bit; each with 6 feet 3-core Henley flexible. Voltage ranges from 100 to 250. Write for folder Y.10.

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53, Hatton Garden, London, E.C.1

HENLEY SOLON ELECTRIC TRADE MARK SOLDERING IRONS

FOR INDUSTRIAL USE

ANNOUNCING

MODEL NO. N.1600

for SPEED INFORMATION and 3-WAY PROTECTION of CASH RECEIVED

A FOUR TOTAL RECEIPTING MACHINE

Providing 3 identical, non-carbon printed records of receipts on

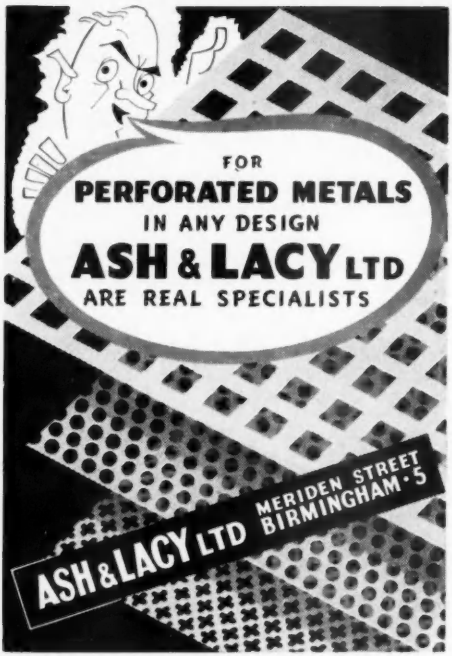
1. The Customer's Account
2. The Receipt Posting Stub
3. The Locked-in Audit Record

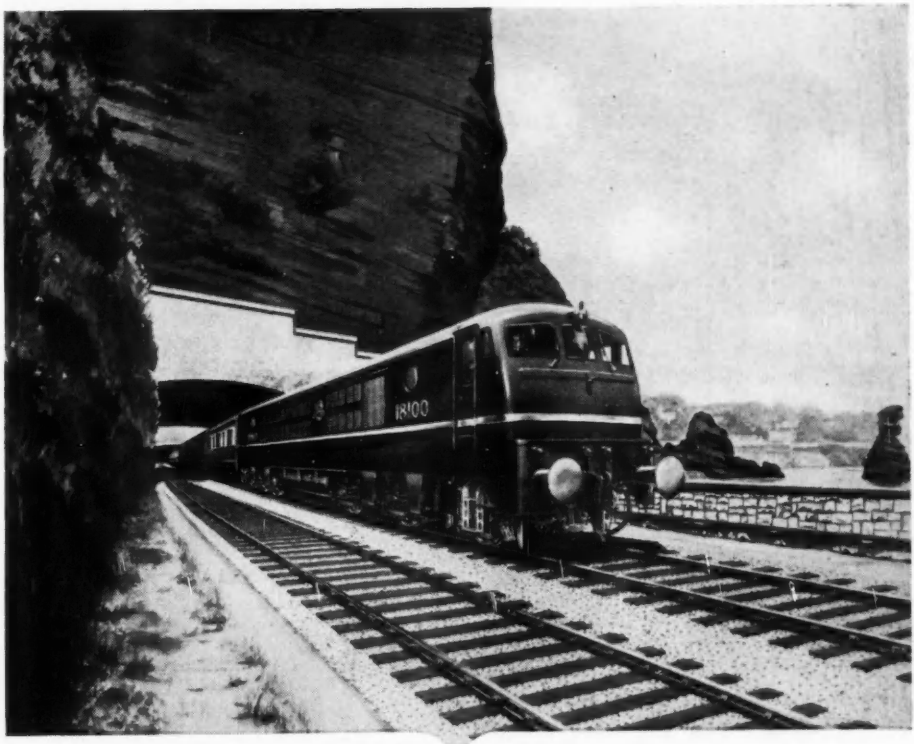
ALL TOTALS UNDER LOCK & KEY

National

For details and demonstrations please write or phone

THE NATIONAL CASH REGISTER COMPANY LTD. 206 Marylebone Rd., London, N.W.1. Paddington 7070





The First British-Built GAS TURBINE ELECTRIC LOCOMOTIVE

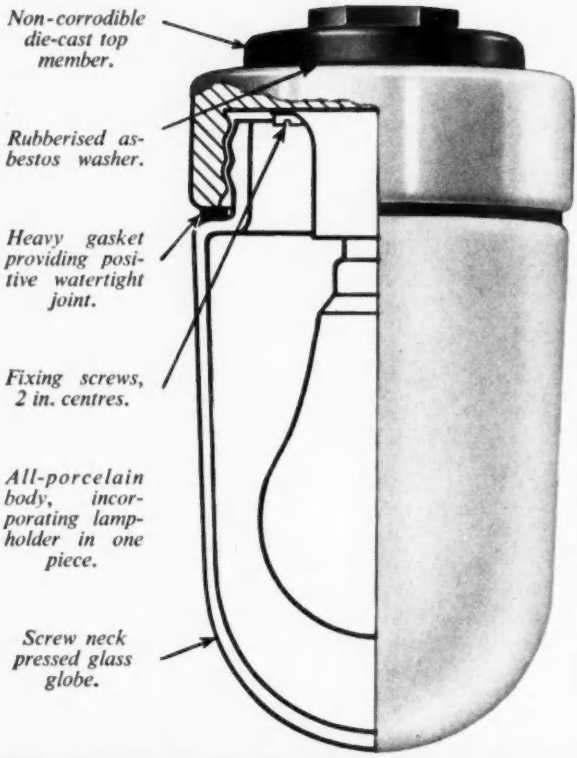
Fifty years of experience in electric traction, together with fourteen years of intensive development of gas turbines, has resulted in the successful production of this Gas Turbine Electric Locomotive designed and built by Metropolitan-Vickers for work on the Western Region of British Railways. Although a new development, this locomotive has very many desirable features which have already been proved by experience.

Whether your problem concerns the choice of a gear wheel or a complete railway electrification scheme, the Metropolitan-Vickers organisation is ready to place at your service its technical competence and vast experience in traction matters

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER, 17
Member of the A.E.I. group of companies

METROVICK *Traction for more efficient transport*

...but R·E·A·L did it in ONE!


Non-corrodible die-cast top member.
Rubberised asbestos washer.
Heavy gasket providing positive watertight joint.
Fixing screws, 2 in. centres.
All-porcelain body, incorporating lampholder in one piece.
Screw neck pressed glass globe.

Original Porcelain Fittings were designed for use in Chemical works. They were multi-membered and fragile, and found favour merely on account of their non-corrodibility.

Then R.E.A.L. took the matter in hand and produced a fitting that swept away all the disadvantages of earlier types. The R.E.A.L. patent gave a one-piece fitting of exceptional mechanical strength, in which wiring and erection was reduced to its easiest.

The simplicity of the one-piece porcelain body, with its integral lampholder and accurate internal thread, keeps the price at a competitive level . . . and makes the R.E.A.L. fitting ideal for general purposes.

Send for leaflet of complete range of 60, 100 and 200 watt fittings.

R·E·A·L | *non-corrodible watertight fittings*

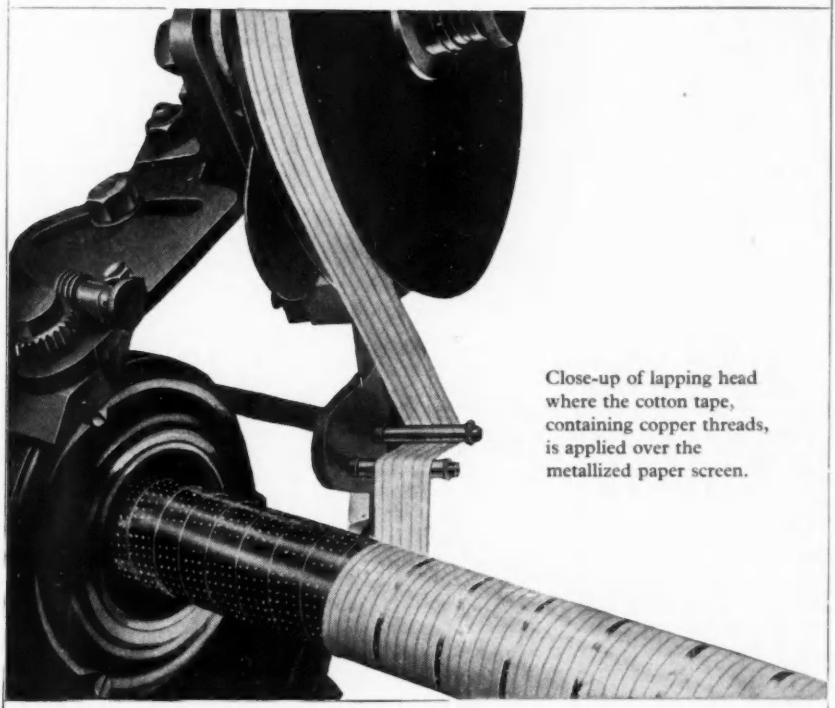
THE ONLY SCREW-NECK ONE-PIECE FITTING IN THE WORLD

Issued by ROWLANDS ELECTRICAL ACCESSORIES LTD., R.E.A.L. WORKS, BIRMINGHAM, 18

ONE SURE FACT ABOUT CABLES

If you need cables of any type, in any quantities, for any installation, be sure of *one* thing: if you choose to deal with any firm listed below you will know for certain that the standards of design and quality are the highest possible, because they are standards set, rigorously kept and constantly reviewed by C.M.A.

AND ONE OF THE MANY FACETS OF CABLE MAKING:



Close-up of lapping head where the cotton tape, containing copper threads, is applied over the metallized paper screen.

MEMBERS OF THE C.M.A. & AFFILIATED MANUFACTURERS' ASSOCIATIONS

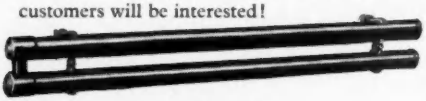
C·M·A

British Insulated Callender's Cables Ltd. Connollys (Blackley) Ltd. The Craigpark Electric Cable Co. Ltd. Crompton Parkinson Ltd. Enfield Cables Ltd. The Edison Swan Electric Co. Ltd. Greengate & Irwell Rubber Co. Ltd. W. T. Glover & Company, Ltd. W. T. Henley's Telegraph Works Co. Ltd. Johnson & Phillips Ltd. Liverpool Electric Cable Co. Ltd. Metropolitan Electric Cable & Construction Company Ltd. Pirelli-General Cable Works Ltd. (The General Electric Co. Ltd.). Siemens Brothers & Co. Ltd. (Siemens Electric Lamp & Supplies Ltd.). St. Helens Cable & Rubber Co. Ltd. Standard Telephones & Cables Ltd. The Telegraph Construction and Maintenance Co. Ltd.

CABLE MAKERS ASSOCIATION 52/54 HIGH HOLBORN, LONDON, W.C.1. PHONE: HOLBORN 7633

FOR *draught* PREVENTION

Thermotube Electric Heaters are ideal for draught prevention and general temperature rise in smaller rooms, passages and landings. Tubes may be mounted singly or in banks of two, three or four, *without the need for changing terminal boxes.* This flexibility of installation is an important and appealing feature of Thermotubes, which can ease many a heating problem this winter. Your customers will be interested!



Thermotube
ELECTRIC HEATERS

The Thermovent Technical Advisory Service is always glad to help you with any problem of Space Heating.

THERMOVENT HEATING :
E. K. COLE LTD., 5 VIGO STREET, LONDON, W.1.

Build your own equipment with

DEXION
SLOTTED ANGLE

★ Can be used over and over again

★ No drilling, measuring or painting

★ Just cut it and bolt it, that's all

Write or 'phone for illus. literature D11

DEXION LIMITED
Triumph House, 189 Regent Street, London, W.1.
TELEPHONE REGENT 4841-5

'ENGLISH ELECTRIC'

mercury-arc rectifiers

D.C. Power for Steel Works

The 'ENGLISH ELECTRIC' sealed steel tank mercury-arc rectifier, with its simplicity of operation and minimum maintenance requirements is particularly suitable for unattended sub-stations. One of its many industrial applications is in steel works for supplying D.C. power, both for main mill motors and auxiliary services. The illustration shows a sub-station containing three 1,500 kW 'ENGLISH ELECTRIC' rectifiers supplying power to the main drives of a Cross Country Mill at the Round Oak Steel Works.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

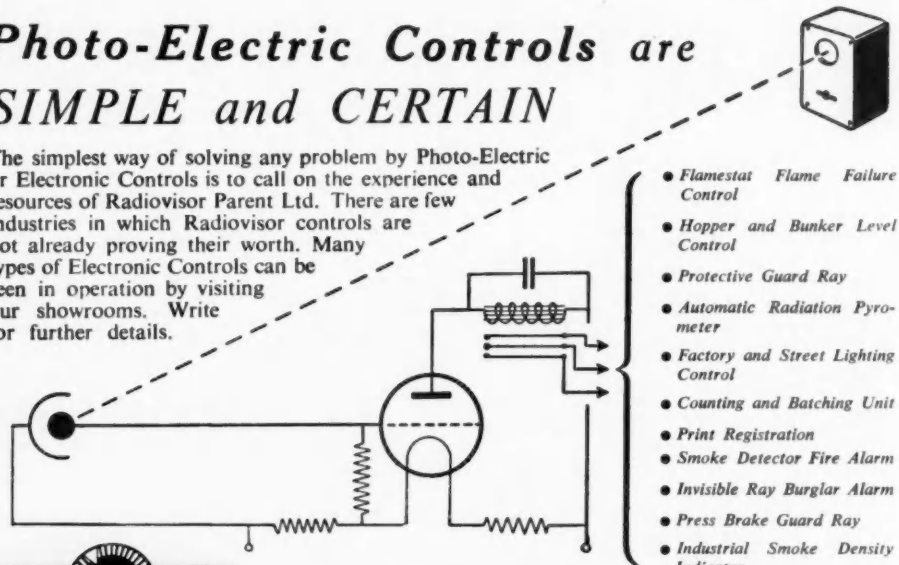
Rectifier Sub-Station Department, Stafford

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

RMA.4

Photo-Electric Controls are SIMPLE and CERTAIN

The simplest way of solving any problem by Photo-Electric or Electronic Controls is to call on the experience and resources of Radiovisor Parent Ltd. There are few industries in which Radiovisor controls are not already proving their worth. Many types of Electronic Controls can be seen in operation by visiting our showrooms. Write for further details.



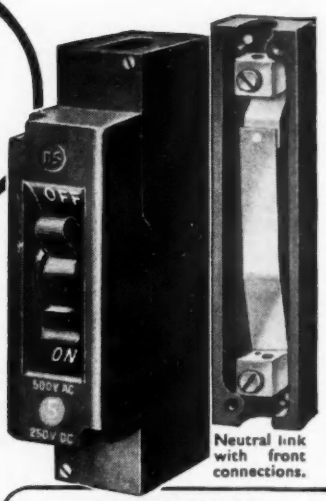
- *Flamestat Flame Failure Control*
- *Hopper and Bunker Level Control*
- *Protective Guard Ray*
- *Automatic Radiation Pyrometer*
- *Factory and Street Lighting Control*
- *Counting and Batching Unit*
- *Print Registration*
- *Smoke Detector Fire Alarm*
- *Invisible Ray Burglar Alarm*
- *Press Brake Guard Ray*
- *Industrial Smoke Density Indicator*

RADIOVISOR
TRADE MARK

PHOTO-ELECTRIC AND ELECTRONIC CONTROLS

RADIOVISOR PARENT LTD . 1 STANHOPE ST . LONDON N.W.1 . TEL: EUSTON 5905/6

Introducing **DORMAN MINIATURE CIRCUIT BREAKERS**



Neutral link with front connections.

TESTED BY THE NATIONAL PHYSICAL LABORATORY

Designed to give unfailing protection to all types of electrical circuits and equipment up to a maximum current rating of 50 amps at 500 V a.c. or 250 V d.c. On ordinary overloads tripping may be instantaneous or have an inverse time delay characteristic, but in all cases instantaneous tripping occurs on a large overload or short circuit. The mechanism is normally sealed to prevent interference with settings. Neutral mechanism designed as a separate unit, to be fitted underneath the main unit when required. Certified rupturing capacities 10,000 amp at 250 V d.c., 10,000 amp at 440 V a.c. at pf. 0.62 lag. Complies with the requirements of Lloyd's Register of Shipping.

ORDSAL

DIMENSIONS
5" Length x 1⅛" Width x 3" MAXIMUM PROJECTION

Write for illustrated folder M.C.B.

DORMAN & SMITH LTD · MANCHESTER · 5

SHREWD DIRECTORS—

know that Lancashire Dynamo make the right motor for the job!

An L.D.C. 5 H.P. Vertical Fankuld Flame-Proof Motor.

'Lancashire Dynamo' electric motors are built in a large number of standard sizes and types covering a wide range of outputs. When it's a question of special requirements 'Lancashire Dynamo' supply motors of the correct enclosure for *every* industrial situation.

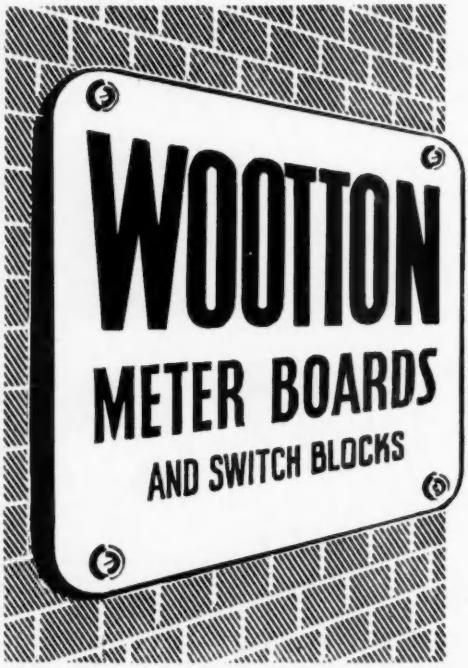
LANCASHIRE CRYPTO LDC

The Symbol of Power in Industry for over 50 years.

LANCASHIRE DYNAMO & CRYPTO (MFG.) LTD.

Trafford Park, Manchester 17. **Acton Lane, Willesden, London, N.W.10.**

M.9



We have been making and supplying the Electrical Industry with METER BOARDS and Switch Blocks for over 27 years

- *FIRST CLASS WORK*
- *QUICK DELIVERIES*
- *COMPETITIVE PRICES*

We invite your enquiries

WOOTTON & CO. LTD.
ALMA WORKS, PONDERS END, MIDDLX.
TELEPHONE: HOWARD 1858
L1048A

Chartex — *INSULATING MATERIALS*
Regd. Trade Mark

PAPER & FABRIC LAMINATED TUBES, FORMERS, SHEETS & MACHINED PARTS. FIBRE & EBONITE RODS, TUBES & SHEETS

W. H. GRIMMER
50, BOW LANE, CHEAPSIDE, E.C.4
WORKS: ROMFORD, ESSEX
Phone: City 1791-2 Cables: Chartimer, London.

WIREOHMS, LTD.
NOTTINGHAM

Makers of
ALL TYPES OF
ELECTRIC ELEMENTS

SOLE WORLD DISTRIBUTORS:
H. J. BALDWIN & CO., LTD.
Baldwin House Nottingham

NEWALL Adjustable GIRDER CLIPS (SHERARDISED FINISH)

fit all types and sizes of Girders

Standard Size for ⅜ in., ½ in. or 1 in. diameter Tubes or Armoured cables of equal diameter.

Tubes or Cables can be run at **right angles or parallel to** Girders, by releasing countersunk locking screw, and turning Saddle Plate one-quarter turn.

Larger Sizes for 1¼ in., 1½ in. and 2 in. diameter Tubes or Armoured cables. Multiples to order.

EVANS & NEWALL LTD.
(T.I.M.)
Primrose Street, New Cross, Manchester, 4
Telephone: CENtral 1253-4 *Telegrams:* "Cymric"

Illustrated Catalogue and full particulars will be forwarded on request

Note Push Button Operation

SIEMENS

EARTH LEAKAGE CIRCUIT BREAKERS

ARE NOW

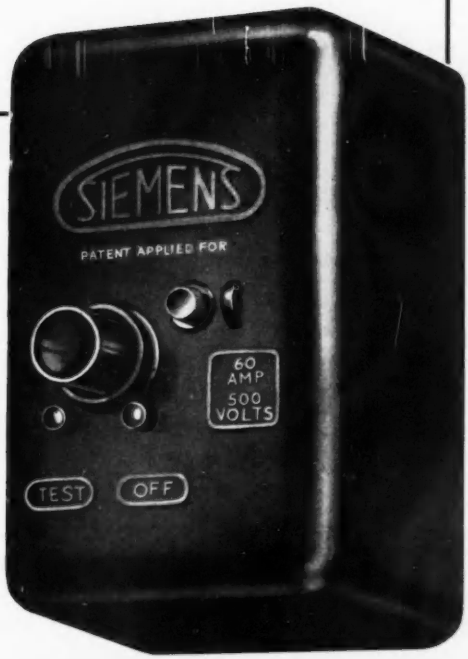
MADE IN THREE SIZES

30, 60 and 100 AMPS

for both

Double Pole and Triple Pole

A.C. CIRCUITS



Siemens Earth Leakage Circuit Breakers afford complete protection against earth leakage potential on consumers' apparatus. The Trip Coil is calibrated to operate at 22 volts with an additional 200 ohms resistance in the earth circuit.

These Earth Leakage Circuit Breakers are available fitted with short circuit and overload features.

Write for Catalogue No. Z. 174

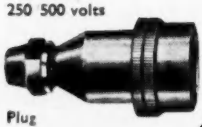
● **Many Caravan dwellers are now fitting SIEMENS EARTH LEAKAGE CIRCUIT BREAKERS for safety earthing when using Mains Electricity Supply**

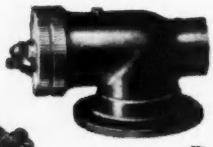
Advt. of **SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED**, 38/39 Upper Thames Street, London, E.C.4
Branches at-Belfast, Birmingham, Bristol, Cardiff, Dublin, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield.

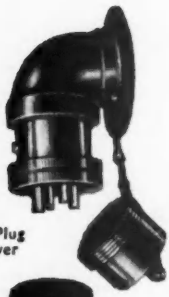
REGD. TRADE MARK
NIPHAN

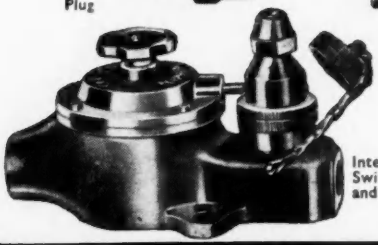
WEATHERPROOF METAL-CLAD PLUGS, SOCKETS, SWITCH PLUGS, ETC. for all electrical purposes

5/300 amp.
250/500 volts


Plug


Through Angle Socket and Cover


Flange Angle Plug and Cover

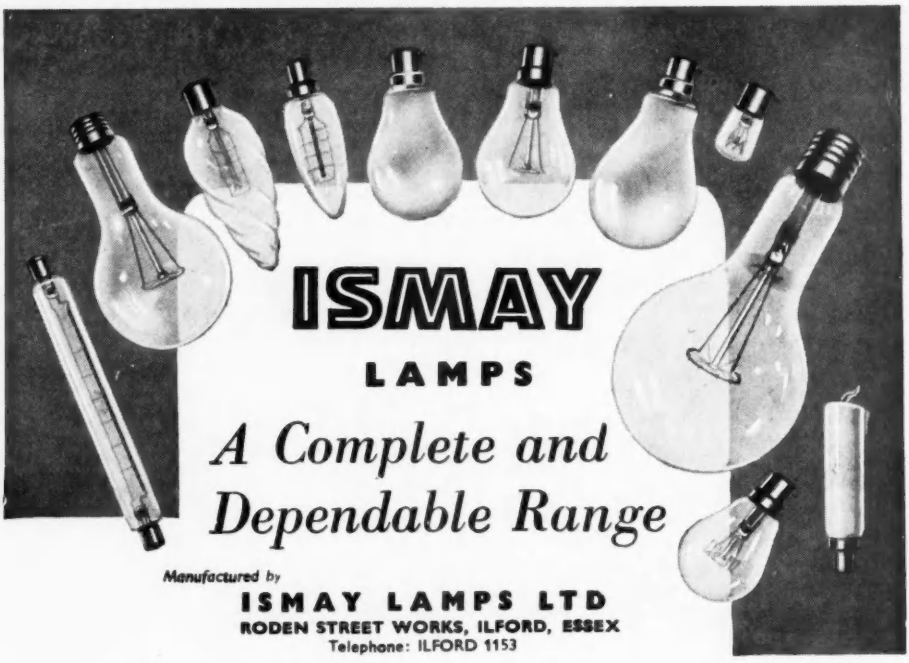

Interlocked Switch Socket with Cover and 3- or 4-pole Plug

Plain Socket

Latest Catalogue on Application

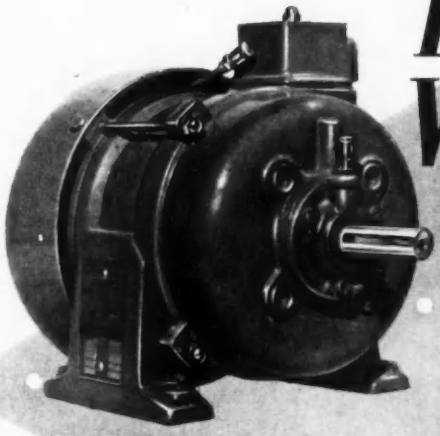
SIMMONDS & STOKES (NIPHAN) LTD
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. CEYLON, Walker & Greig, Ltd., Colombo. NEW ZEALAND, Samuel Brown, Ltd., Wellington. KENYA, R. W. Ketchley & Co., Nairobi, British East Africa.*



Manufactured by
ISMAY LAMPS LTD
RODEN STREET WORKS, ILFORD, ESSEX
Telephone: ILFORD 1153

PLAY SAFE WITH YOUR POWER PLANT . . .



Use a BROOK MOTOR & STARTER

Careful selection of the right type of motor with a starter to match can save those precious man-hours lost through break-downs.

MAKERS OF A.C. ELECTRIC MOTORS FROM 0·125 TO 250 H.P.

BROOK MOTORS Ltd

HUDDERSFIELD • ENGLAND

1. LA. 214.

TWW

New and Reconditioned
ELECTRICAL EQUIPMENT
from Stock

A.C. MOTORS

400/440 volts 3 phase 50 cycles

H.P.	R.P.M.	Maker	Frame	Windings
150	750	Brook	S. Protected	Slip Ring
150	1,000	Brook	S. Protected	Slip Ring
145	290	Westinghouse	Protected	Slip Ring
120	750	Brook	S. Protected	Slip Ring
120	1,000	Brook	S. Protected	Slip Ring
110	600	Brook	S. Protected	Slip Ring
100	485	G.E.C.	Protected	Slip Ring
90	750	Brook	S. Protected	Slip Ring
80	600	Brook	S. Protected	Slip Ring
75	1,500	Brook	S. Protected	Slip Ring
70	750	Brook	S. Protected	Slip Ring
70	1,000	Brook	S. Protected	Slip Ring
60	500	Mather-Platt	Enc. Vent	Slip Ring
60	500	Crom-Park.	Protected	Slip Ring
60	750	Brook	S. Protected	Slip Ring
55	1,500	Brook	S. Protected	Slip Ring
50	465	Brush	S. Protected	Squirrel Cage
50	600	Brook	S. Protected	Slip Ring
50	750	Brook	S. Protected	Slip Ring
50	1,000	Brook	S. Protected	Slip Ring
45	920	Phoenix	Protected	Slip Ring
45	730	B.T.H.	T.E.F.C.	Slip Ring
42½	1,500	Brook	S. Protected	Slip Ring
40	481	Bruce-Peebles	Totally Enc.	Slip Ring
40	580	E.E.C.	Protected	Slip Ring
40	750	Brook	S. Protected	Slip Ring
40	1,000	Brook	S. Protected	Slip Ring
35	720	Metro-Vick.	S. Protected	Slip Ring
35	1,440	Crom-Park.	S. Protected	Slip Ring
30	720	Brook	Enc. Vent	Squirrel Cage
30	725	Metro-Vick.	Enc. Vent	Slip Ring
30	735	Crom-Park.	S. Protected	Squirrel Cage
30	750	Brook	S. Protected	Slip Ring
30	960	B.T.H.	Enc. Vent	Slip Ring
30	960	Verity	S. Protected	Slip Ring
30	980	B.T.H.	S. Protected	No Lag
30	1,000	Brook	S. Protected	Slip Ring
28	970	Metro-Vick.	Drip Proof	Squirrel Cage
27	960	Crom-Park.	Pipe Vent	Squirrel Cage
27	1,000	Brook	S. Protected	Squirrel Cage
25	358	E.E.C.	T.E. Vent	Slip Ring
25	580	Bruce-Peebles	T.E.F.C.	Slip Ring
25	580	Metro-Vick.	Protected	Slip Ring
25	720	L.D.C.	Enc. Vent	H. Torque
25	735	Crom-Park.	S. Protected	Squirrel Cage
25	750	Brook	S. Protected	Squirrel Cage
25	750	Brook	S. Protected	Slip Ring
25	940	L.D.C.	S. Protected	H. Torque
25	960	B.T.H.	S. Protected	Slip Ring
20	360	E.E.C.	T.E. Vent	Slip Ring
20	470	Crom-Park.	S. Protected	Squirrel Cage
20	710	Higgs	S. Protected	Squirrel Cage
20	720	Crom-Park.	S. Protected	Squirrel Cage
20	955	E.E.C.	S. Protected	Squirrel Cage
20	960	Crom-Park.	S. Protected	Squirrel Cage
20	1,000	Brook	S. Protected	H. Torque
20	1,000	Brook	S. Protected	Slip Ring
20	1,440	B.T.H.	T.E.F.C.	Squirrel Cage
20	1,450	Mather Platt	Enc. Vent	Squirrel Cage
20	1,460	L.S.E.	S. Protected	Slip Ring

NOTE. Selected range only, numerous other motors available below 25 H.P. Extensive stocks carried.

Detailed priced Stock List forwarded on request.

THOS W. WARD LTD
ALBION WORKS · SHEFFIELD
'PHONE 26311 (22 LINES) 'GRAMS 'FORWARD'
LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND · W.C.2

EP/1

All Types

FLUORESCENT POWDERS

manufactured by

DERBY & COMPANY LTD.
St. Swithin's House,
11-12 St. Swithin's Lane,
London E.C.4
Telephone: Avenue 5272 (20 lines)

WORKS
MILLMARSH LANE, BRIMSDOWN
MIDDLESEX TEL.: HOWARD 2208

USE **"GUNFIRE"**
TRADE MARK
Time Switches
AND
Process Timers
FOR SATISFACTION
AUTOMATIC LIGHT CONTROLLING CO. LTD., BOURNEMOUTH
Established over 50 years

CLANG
EJECTOR PLUG-TOP
(18 amp. 3-pin)
A "MASTERPIECE" OF DESIGN & CONSTRUCTION
Particulars from
CLANG LTD. CROWN YARD CRICKLEWOOD
Telephone Gladstone 4201 N.W.2.

GOOD NEWS!

TEMCO *the Perfect*
IRON CONNECTOR
is now available off the shelf

With Q.M. & B. Switch (silver plated contacts) No. 653
7/- each

Without Switch No. 651
3/4 each

DELIVERIES FROM STOCK

No longer any need to accept any but the best—thanks to increased production the connector that everyone wants is now in plentiful supply.

- Made to B.S. 562.
- Double-sided earth
- Independent cord grip; no strain on conductors.
- 2-part phosphor-bronze ringed contact sleeves.
- Extra solid bakelite housing.
- Each one packed in a carton.

NO LOOSE PARTS

TEMCO
SUPER IRON CONNECTORS

Marketed by **T. M. C.-HARWELL (SALES) LTD**
37 UPPER BERKELEY STREET · LONDON W1
Telephone: PADdington 1867-8-9

EDISWAN

CLIX

The General Accessories Co. Ltd. and British Mechanical Productions Ltd. have been acquired by The Edison Swan Electric Co. Ltd. All products previously marketed by these two companies will be sold in future through the Ediswan Sales Organisation under the above title.

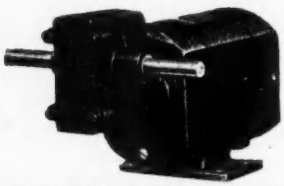
THE EDISON SWAN ELECTRIC Co. Ltd.

155, Charing Cross Road, London, W.C.2

Member of the A.E.I. Group of Companies.

FIRE!
WHERE'S YOUR
NU-SWIFT?
The World's Fastest Fire Extinguishers
— for every Fire Risk
Pressure-operated by sealed CO_2 Charges
NU-SWIFT LTD. • ELLAND • YORKS
In Every Ship of the Royal Navy

GEARED UNIVERSAL TYPE MOTORS



Fractional Motors Suitable for Every Demand

- Torque 10-2lb-inches
- Speed 400—50 rpm
- Suitable for electronic controls
- Built to B.S. specification

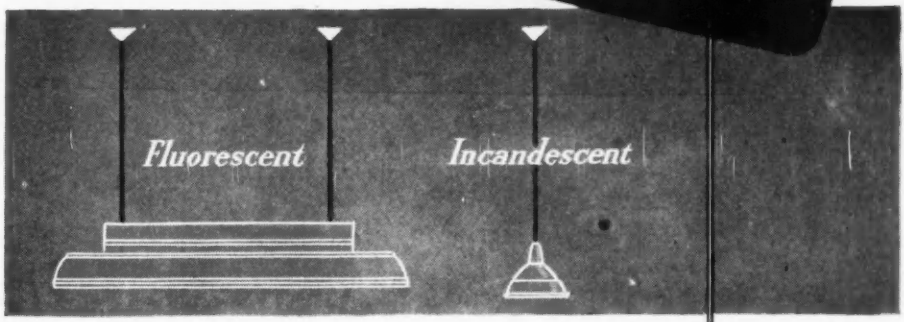
HILLMAN ELECTRIC MOTORS LTD.
2-3 NORTHWOLD BUILDINGS, NORTHWOLD RD., LONDON, N.16. AMHERST 5274-5

SCEMCO Fluorescent Fittings
have the three success essentials:
Best Materials
High Standard Finish
Keen Prices
SCEMCO add a free replacement service—this makes satisfaction guaranteed.
SCEMCO Ltd. of SOHO St., LONDON, W.1. Ger. 1461
20-page Detail Digest on request

Economy of means...

1. *Cable and support in one.*
2. *Will carry the heaviest fittings with ample factor of safety.*
3. *No stress on conductors.*
4. *Completely fireproof.*
5. *Sealed against moisture.*
6. *Any length available.*
7. *Pre-assembled.*
8. *Suits all standard fittings.*

PYROTENAX CABLES FOR PENDANT DROPS



Pyrotenax cable is admirably suited to Pendant drops. By assembling lengths of standard Pyrotenax copper-covered mineral insulated cable to suitable terminal fittings a simple and effective cable unit is produced that combines the duties of conductor and support, and incorporates all the well known virtues of Pyrotenax Cabling, such as resistance to fire and moisture, and complete freedom from need for maintenance and replacement. These units are available in pre-assembled lengths to dimensions specified by customer. They are made mainly from 2 core ·002 cable, and are already fitted with sealed terminal glands which suit standard types of ceiling and lamp fittings designed for screwed conduit. They can also be supplied in any other size of cable.

Pyrotenax

COPPER COVERED MINERAL INSULATED CABLES

FIRE RESISTANT TROUBLE-FREE

ELECTRIC CABLES FOR INDOOR AND OUTDOOR WIRING

PYROTENAX LIMITED · HEBBURN-ON-TYNE

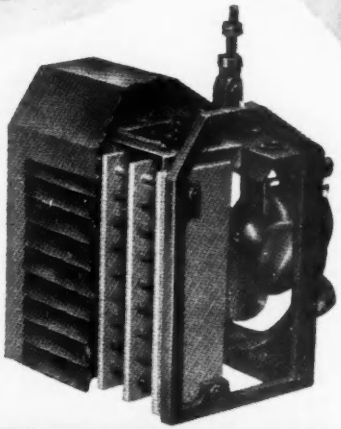
Phone: Hebburn 32244/7 LONDON: Phone Abbey 1654/5 BIRMINGHAM: Phone Midland 1265

GD57

UNIT HEATERS

Made in 3 sizes 3, 5 and 10 Kw

- ALL ELECTRIC
- SIMPLE TO INSTAL
- ECONOMICAL TO RUN
- AUTOMATIC CONTROL
- REFRESHING ATMOSPHERE IN SUMMER
- AUGMENTS EXISTING HEATING SYSTEMS
- MINIMUM OF MAINTENANCE

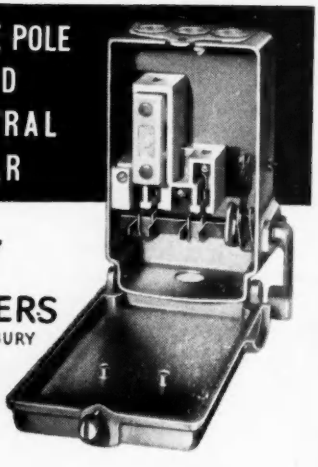


SEND FOR LIST 57

CARTER & COMPANY (NELSON) LTD.

NELSON LANCASHIRE TELEPHONE 638

SINGLE POLE AND NEUTRAL GEAR by SANDERS WEDNESBURY



METAL CLAD SWITCH FUSE FOR CONDUIT ENTRY. 15 AMP. FUSE
LIST NO. N.101RC.

For new and used machine tools . . . power presses . . . sheet metal working and woodworking machinery, etc. . . . **F. J. EDWARDS, LIMITED,** 359-61, *Euston Road, London, N.W.1. Tel: Euston* 4681-3771. *'Grams: Bescotools Norwest London*

THE NATIONAL FIRE PROTECTION CO., LTD.
Specialists in the protection of motors, switchgear, etc. against
FIRE
Write for free copy of our Electrical Brochure EB.ET.
ESSEX WORKS, FAGGS RD., FELTHAM, MIDDX.
Branches: Birmingham, Leeds, Glasgow, Belfast

MEKELITE INDUSTRIAL LIGHTING UNITS

MEK-ELEK Engineering Ltd.
17, Western Road, Mitcham, Surrey

G.E.C. Circulators and Immersion Heaters

OF ALL TYPES

IMMERSION HEATER
Sheathed wire, horizontal mounting.

IMMERSION HEATER
Thermostatically controlled, horizontal mounting.

IMMERSION HEATER
Cartridge type element, vertical mounting.

CIRCULATOR
Thermostatically controlled, vertical mounting.

Consult the . . .

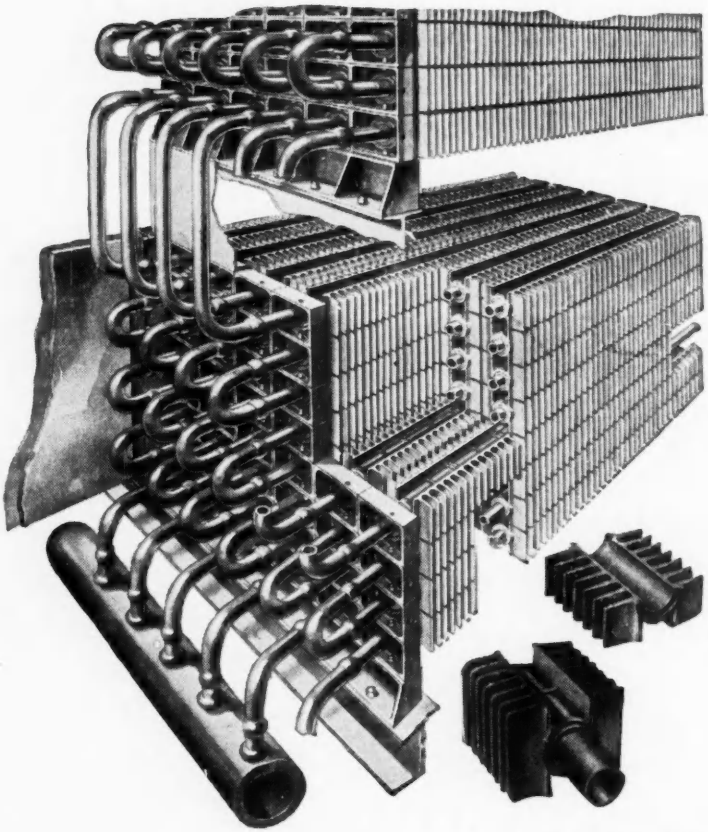
G.E.C.

write for leaflets HO 1245 and HO 1247

THE GENERAL ELECTRIC COMPANY LTD.
MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

SENIOR ECONOMISER

WELDED TYPE, FOR CENTRAL POWER STATIONS



Showing construction of Tube Elements

For all operating pressures up to the highest

SENIOR ECONOMISERS LTD., 11 SOUTHAMPTON ROW, LONDON W.C.1

Telephone: HOLborn 7543-4 and 1158

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. January 31, 1952

AEROFLEX CERAM TYPE CSK

60 AMP REWIRABLE CARTRIDGE FUSE LINKS

Wirings 60, 45, 30 and 15 amps.

These fuse cartridges comply with the dimensions of BS 1361 for 60 amp. main fuses in consumers' units but retain all the properties of earlier Aeroflex fuses. They have been tested and certified by A.S.T.A. in Aeroflex type AFSK units in Category AC4 of BS 88 at 440 volts. Aeroflex Ceram type CSK fuses withstand frequent momentary heavy overloads and yet will operate on persistent light overloads with a fusing factor of 1.25. There is no deterioration through ageing and no change in cold resistance.

Aeroflex Ceram CSK Fuses are entirely suitable both for domestic circuits and 440v. 3-phase services.
Our publication HS 2 gives full details.

BS 1361 DIMENSIONS and Discrimination Test
BS 88 Category 440 AC4 Class P Performance

LONDON:
34 *Victoria Street, S.W.1*
GLASGOW:
162 *Buchanan Street, C.1*

Aeroflex
HOPE'S PATENTS

PARMITER HOPE & SUGDEN LTD.
FLUVENT ELECTRICAL WORKS, LONGSIGHT, MANCHESTER, 12.

dm PH 31

JOHN THOMPSON
WATER TUBE BOILERS

Latest radiographic methods and equipment are used for the inspection of fusion welded joints in boiler drums and other pressure vessels.

Using X-ray photography.

JOHN THOMPSON WATER TUBE BOILERS LIMITED
A SUBSIDIARY OF JOHN THOMPSON LTD.
WOLVERHAMPTON

WT.56